XXXII. April, 1907 No. 4.

MUNICIPAL ENGINEERING

A MONTHLY MAGAZINE

DEVOTED TO THE IMPROVEMENT OF CITIES

CONCRETE CONSTRUCTION, PAVING, SEWERAGE, WATERWORKS, STREET LIGHTING, PARKS, GARBAGE DISPOSAL, BRIDGES.

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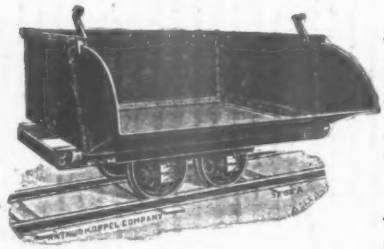

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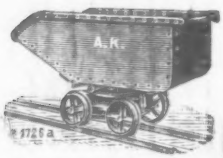

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MUNICIPAL ENGINEERING

VOLUME XXXII. APRIL, NINETEEN HUNDRED SEVEN. NUMBER FOUR

THE COMMERCIAL VALUE OF ARTISTIC CONCRETE.

By Louis H. Gibson, Architect, Indianapolis, Ind.

The friends of the cement block are greatly pleased with the plan of the Association of American Cement Manufacturers to develop an artistic interest in cement block design. This they are doing by offering substantial prizes for designs for various kinds of small houses. There are eighteen prizes, ranging from $200 to $40. There are six classes of designs and three prizes for each class, the two highest being $200 and each of two of the others being graded down to $40.

The program for this competition has been scattered broadcast among architects and architectural draftsmen, has been published in the various architectural and engineering papers as it was published in the last number of MUNICIPAL ENGINEERING. The program was carefuly prepared and will be fairly judged under the rules governing such competitions. The prizes are of sufficient value and the prestige which would result from their winning of sufficient interest to develop a sincere and active interest upon the part of a large number of architectural designers of the country. These designs will be published and be spread before all of the architects, engineers and builders of America and other English-speaking nations.

It is hardly possible to anticipate the advantage which will result from this intelligent and well-conceived plan upon the part of the Association of American Portland Cement Manufacturers. It will inure, not only to their benefit and to the benefit generally of cement workers all over the world, but to the manufacturers of block-making machinery, the makers of cement blocks, as well as to the public at large.

After all it is from the public that the greatest benefit will be derived. The public buy the blocks, the manufacturer makes them; he in turn patronizes the manufacturer of the machine, and altogether this involves the use of cement. The effort on the part of the cement manufacturers is worthy and it will develop splendid results commercially, because it will show what can be done artistically.

It can not be denied that the cement block industry has been a relative failure, largely on account of the inartistic handling of the material. There are other causes, but no matter if the cement blocks and all of them had been structurally ideal and made mechanically perfect, it yet would have been a relative failure, because of the inartistic character of the blocks and because of inartistic handling.

This competition in its results will attract the attention of architectural artists from all directions; it will be participated in by men of splendid training and adequate experience, and there will be laid before the world splendid documents which will shame previous efforts in cement block design and execution. Those who have been familiar with the cement block industry from its incipiency have predicted just what has happened—that is, without the touch of the artist that the business would go down. Many of us saw in the beginning that the work of making cement blocks was in bad hands, so far as the credit of that industry was concerned. There have been very few issues of this magazine where this matter has not been considered. Cement workers have been warned as to the position in which they were placing themselves, but in a large measure the suggestions have been disregarded. Under this new movement, however, there will be presented an object lesson of such a pronounced and startling character that there can be no escape from its teachings.

In the program for this competition the limit of cost ranges from $2,000 to $4,500 per house, and it will be found that there is no excuse for ugliness in a house of any sort. If any part of one of these structures can be made beautiful, all parts may be beautiful; there is no excuse for an ugly detail. The beautiful trimming of a window, a doorway, the pleasing

form a string course, a well-proportioned and well-formed cornice need cost no more than the ugly form. The beautiful form involves no more of material and no more of labor in its fabrication than does a crude and ugly and common form. This relates to detail—the door, the window, the string course and other parts. Good proportion costs no more than bad proportion; good composition and arrangement of parts costs no more than a faulty, crude and common arrangement. A beautiful house need cost no more than an ugly house. In truth, there is no excuse for an ugly thing in this world. The beautiful thing is the thing in place.

By way of illustration it may be said that few of us appreciate the improvement that has been wrought in the manufacture of brick. This is not alone through the reduction of the cost or in the improvement of the ordinary form, but as well in the production of the artistic form. While most molded brick which were made a few years ago were uninteresting and often ugly, there are now those made which are truly beautiful and artistic. There is absolutely no reason why concrete forms may not be made which are as beautiful as anything that the world has ever known in architectural design. There is no reason why this should not be true; there is every reason why it has not been true. The design for cement blocks of an artistic character has not been furnished by the manufacturer. The public and the architect have asked for, have sought earnestly and eagerly good designs, and have nearly always met with discouragement. Certainly the result has been such as to drive the best builders away from the consideration of this building medium.

The example of brick manufacture was cited above. There is a certain analogy between brick design and cement block design, with the inherent advantage in favor of the cement. Because of the size of the forms and the manner in which the blocks are handled and cured, the cement block manufacturer has a more pliable medium in his hands. The larger form of the block certainly presents great advantages. Nevertheless we have beautiful designs in brick and in their decorative forms all over this country, and it is rare indeed that we can point to the beautiful buildings where cement blocks have been used; certainly few important structures in this country.

The brick-maker has in a measure blazed the trail for the cement block maker. In the early history of decorative brick-making there was somewhat of prejudice against the use of machinery in the production of things artistic. It was affirmed and believed that the artistic which was in mind could only find adequate expression through the intervention of the tool which was in hand. Certain kinds of structural work and certain details of carving will always have to be done by hand, yet it is true that many decorative details and forms can be produced and reproduced as well through the agency of the machine as through the agency of the hand. It is the artistic impulse of the mind, guiding the hand, which produces the result. Why may it not be true that the same artistic impulse and the same mind which guided the hand may also design and guide the work of the machine. The form which the machine produces may be designed by a great artist. A great artist may model and execute the original design. This may be used in the formation of the matrix through which his artistic design may be produced and reproduced in concrete by the hundred, the thousand or more. Some years ago a Boston manufacturer of molded brick employed Mr. Evans, a distinguished sculptor of architectural decoration, to design for his firm certain forms to be molded in brick. Mr. Evans had formerly been doing a great deal of work for H. H. Richardson, the architect; he did the carving on what was then the New Brattle Street Church in Boston, the Trinity Church. He did much work on the City Hall at Albany and on the New York State Capitol, and elsewhere where Mr. Richardson was engaged as the architect. Through the medium of Mr. Evans, the artist, the first artistic molded brickwork was done in this country, and being artistic it added large value to the raw material, the clay, and was a great commercial success. Through the medium of Mr. Evans' art and the inventive, mechanical and business ability of the manufacturers a great and successful business was built up. It is very probable that had Mr. Evans gone into the brick business he would not have made a commercial success of it, and it is equally certain that had these manufacturers depended upon their own artistic impulse or capacity to design the beautiful forms, they would have failed in this part of their undertaking, and in so far as their success was dependent upon the public demand for the beautiful, they too would have failed. Through one medium or another the manufacturers of ornamental brick have pursued a similar course, and the measure of their success has been very largely determined by the quality of the artist. There had to be a business ability, but no amount of understanding or commercial energy will take the place of or supplant the weakness of inferior designs; both are necessary. Mr. Evans was responsible for the work of the ma-

chine, in so far as the machine produced an artistic result. The machine produced an expression of the individuality of Mr. Evans.

It would be difficult to justly estimate the commercial value of Mr. Evans' art to manufacturers of this product. It has absolutely enlivened all the capital invested in their business for these many years. It has made a live profitable asset out of what might have been a dead one.

We must not discount the art of the machine. In a measure every bit of bronze sculptural work is dependent upon a mechanical process. It is a machine product. To be sure there is the design of the artist, but the final realization of his design, its final expression in material, is dependent upon a mechanical process. He designs a bit of statuary, he models it, he expresses the best there is in him through the medium of the clay; and from the model a mold is made and the figure is cast. The making of the mold and the casting of the figure are in principle no more or no less mechanical than the making of the mold for the brick which are decorative, and it is no more or no less mechanical in either case, whether there is one brick or one statue or a thousand. The last one of a hundred thousand of brick or statuary is dependent only on the original impulse of the artist and the mechanical perfection of the operation. This illustration is given at this length for the purpose of inducing greater respect than many of us have for a mechanical process as related to things artistic. No artist could personally execute all of his work on a building. Mr. Evans probably had men working for him, handling the chisel and the hammer, when he was decorating Mr. Richardson's buildings, who had little, if any, more artistic impulse than the machine which made the brick.

The concrete block makers of America have been undertaking to fly commercially with one wing. Many of them are possessed with the business instinct, certainly with a business ambition, though one can recall instances where even the business wing was shy on prominent feathers or badly clipped. The concrete block industry must have two wings in order to fly; there must be the wing of the artist and the wing of the business; it makes no difference which one is short, either deficiency will cause failure.

The concrete block maker has proved his own deficiency. He has been trying to fly on one wing long enough. He has his hands full in developing the wing of mere business. This involves primarily mechanical excellence. He certainly must have assured himself by this time that in order to sell his product it must be well made from the manufacturer's point of view. The artistic point of view may be never so strong, nor so nicely developed, but that is dependent upon the other for successful venture before the public. The artist furnishes the design for the form; it is for the manufacturer to properly materialize the idea. There must be the surface, the texture and the color as related to the visible part of the product, and there must be the density and stability as related to the body of the block.

It unfortunately happens that the same quality of workmanship and the same intelligently expressed ideas of composition of the concrete itself, that will produce a solid and relatively impervious block, will in a large measure produce the pleasing surface and the artistic texture. An adequate handicraft is essential to the realization and materialization of the artistic impulse.

The great practical fault which one finds with the average concrete block is its pasty texture, owing to a super-abundance of cement, and its dull, leaden color, owing not only to a super-abundance of cement, but to the character and quantity of the aggregate, the inert material, which has so much to do with the texture of the surface. In a previous article this matter was treated at length, and it was stated that there was a normal concrete, a mixture which realized the full strength and efficiency of the combined materials. This article considered concrete from the structural point of view. It affirmed that it was first desirable to so compose the aggregate, by determining tests, that the voids would be reduced to a minimum, and then to add only so much cement as would surely fill the voids. This makes the strongest concrete, the best concrete structurally, and in so doing it presents the most beautiful surface that is possible with the materials involved. The beautiful texture may be secured by the same means that will produce the strongest substance. The ideal texture is that where the particles of aggregate are practically exposed, and where there is only a sufficiency of cement on the surface to cause the particles of the aggregate to adhere—simply this and nothing more.

Texture is one thing and color is another. A light colored surface, either a buff or gray, in any of its tones, can not be secured with muddy colored aggregate, or dark or leaden colored cements. Many cements are not suited to the production of the artistic block. Many of the cements on the market, however strong they may be, are absolutely deadening in their color influence. It is true that certain pigments may be used for the purpose of securing various colors, but they must always be

for the color or tone darker than the cement itself. One may secure a lighter color effect by using a light aggregate, but with certain grades of cement there are certain deadening qualities in color influence which can not be eradicated. The best color effects which may be secured by the aid of pigments will begin with the lightest possible color of both cement and aggregate.

While we are hardly far enough advanced at this time in the manufacture of concrete blocks to consider very seriously or accurately the use of artificial coloring material, it may be well to know what can be done in this way. A few years ago the writer saw in Havana, lived in a room where there was a beautiful concrete floor with a many-colored border running around the room, and a beautiful center-piece and figures disposed on the body of the floor. The design was artistic, the colors were clear, bright and sharply defined, and the workmanship was superb. Floors of this kind are by no means uncommon. The cement which one sees used in this section, and which was used under the Spanish rule, was very light in color, not to say white, but such as would produce a surface of about the same color and texture as light sand- or oolitic-stone. With this light cement the colors could be graded and at the same time preserve their sharpness of tone and quality. We all call to mind that ordinarily, when we undertake to color cement for a sidewalk, we invariably get a dull, heavy, leaden quality, owing to the color of the cement and the aggregate.

There has recently been placed on the market a cement which is all but white in color, though it is tinged by a warmth which, when combined with the ordinary clean, sharp sand, yields a color of about the same quality as that of the most sought-for light building stone. This cement, when combined with varying aggregates, will always give a rich tone, and when properly combined as to quantity will yield a splendid artistic texture. Not enough attention has been paid to the selection of cement for the production of artistic results in connection with cement block work. The base we will find must be a lighter colored cement and then the gradations of color or tone may be made through the aggregate or pigments. The sharpness, crispness or color and texture can only be properly maintained with a cement base of light color.

STREET NOMENCLATURE.

By S. N. Stewart, Brooklyn, N. Y.

Systematic street nomenclature would daily save thousands of people in every large city car fares, time and vexation.

In most cities there is not only an entire lack of system in street-naming, but instead of simple names that could be easily understood and remembered, many rare long-tailed proper names have been given to streets to perpetuate the memory of one-horse local celebrities—the convenience of the many sacrified to the pride of a few. And in many cases two or three streets in the same city have been given the same name. Philadelphia has 4,000 unnumbered streets—streets named at random after Tom, Dick and Harry, and some other cities have nearly as many.

Even in a city of curving and crooked streets, like Boston, most of the streets can be brought under system, for streets running nearer east and west than north and south can generally be classed with those running straight east and west, and streets running nearer north and south than east and west can be classed with those running north and south.

The lion in the path of reform in street nomenclature is the old resident. He may never have learned much of anything else, but he knows the names of many streets, and the learning of them cost him hundreds of hours of mis-journeying and map-searching. This knowledge, so painfully acquired, would, by systematic street nomenclature, be made rubbish. But if the question were put to a vote (at one of the regular municipal elections) we think that the old resident would be defeated with great slaughter.

System would effect saving in the cost of street-name signs, for "1st St." and "1st Ave." are briefer than other names, and as the number of one street indicates the number of the next, we easily find the one we want, even when the sign is obliterated or gone, as is often the case. In our boss-ridden cities many corners are left for years without signs.

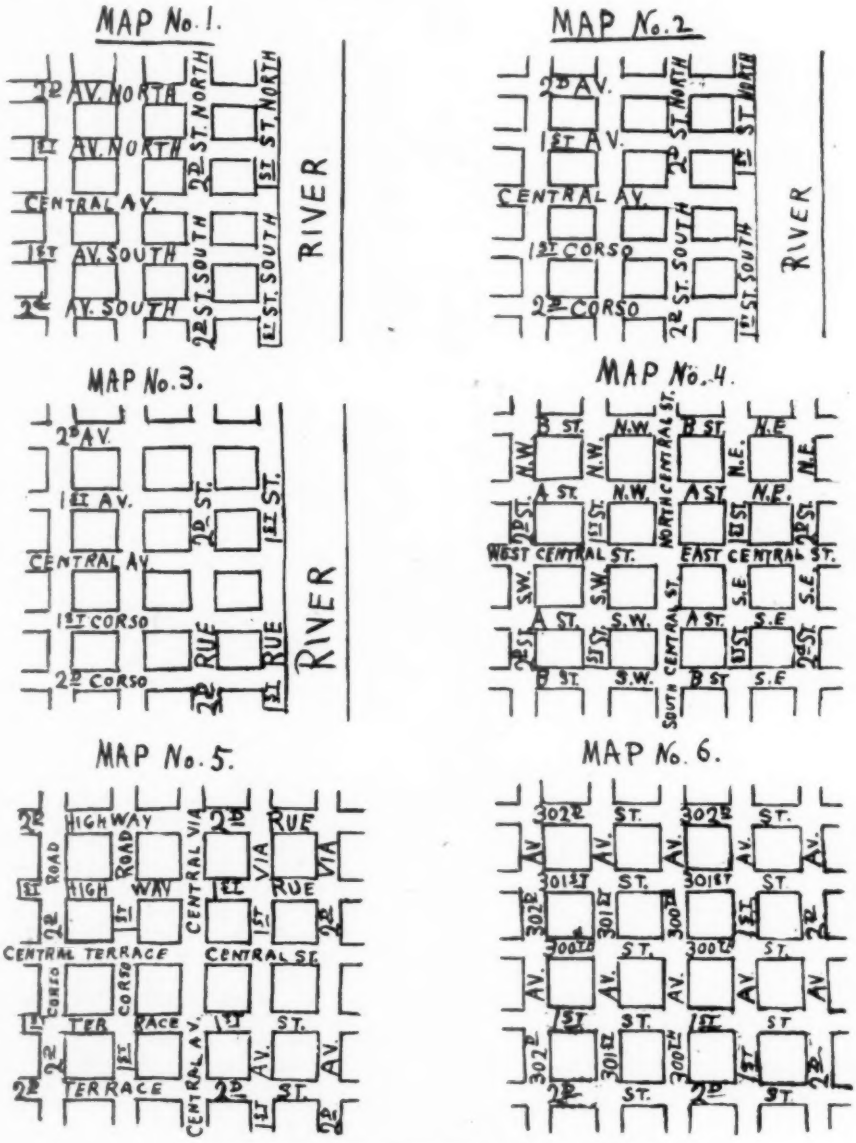
When streets are numbered and houses numbered by the centennial system the house numbers themselves indicate the names of the streets, and street-name signs could, after a time, be dispensed with. As you go down lower 5th Avenue, Brooklyn, for instance, every house num-

ber between 4,000 and 4,100 tells you that the next street you cross will be 41st Street as plainly as if there were a sign on every house saying, "The next street below is 41st Street."

Where all thoroughfares are numbered one can easily estimate the distance and the time required to go to any part of the city.

The simple and sensible system of calling thoroughfares which run in one direction streets and those running in the other direction avenues, and numbering them from 1 up, is, in New York City (Manhattan Borough) worth at least a million dollars a year to residents and visitors. It is generally assumed that it can be applied only to cities which grow in but one or two directions, but we show on Map No. 6 that it can be applied to all.

But it costs nothing, and this has prevented its general adoption. If there were a patent on it, persons controlling the patent would go from city to city explain-



MAPS SHOWING SYSTEMS FOR NAMING STREETS.

ing its advantages, and cities would adopt and pay for it.

A few cities have adopted the "Minneapolis System" shown on Map No. 1. But the words "North and "South" are unnecessary. All the avenues above Central Avenue can be called avenues, and all below be called highways, ways, roads, terraces, rues, strasses, vias or corsos, as shown on Map No. 2. Postmasters in cities where the Minneapolis system is used tell us that they handle letters every day from which the word North or South is omitted, and merchants say that drivers of delivery wagons often go wrong.

We prescribed the system shown on Map No. 2 for Nebraska City twenty years ago, where it displaced the Minneapolis system, and has ever since been in use. The words North and South could have been removed from the streets running parallel with the river by calling the streets above Central Avenue, streets, and those below, rues, as shown on Map No. 3.

Highway, way, road, or terrace would probably be more readily accepted than corso, rue, via or strasse, but the prejudice against the new word soon wears away, as we have seen in the case of the word avenue, which was opposed when first applied to city streets, but the people now like it so well they want to overwork it by making it do double duty, as "Avenue North" and "Avenue South."

We show the Washington system of street nomenclature on Map No. 4. An eight-word system, as shown on Map No. 5, or a two-word system, as shown on Map No. 6, would, we think, be much better. We start at the center of the city with 300th Street and 300th Avenue, in order that we may number both ways and without the numbers clashing. The city would have to grow to be about forty miles long or wide before the numbers would clash. Only a few cities would have to start with the number 300. Most cities could start in the center with 50th Street and 50th Avenue.

Street numbering can be introduced without immediately abolishing old names. The old name-signs could be permitted to remain as long as they would last and the new names be placed beside them. Make the number-names the only official ones and let the old names die out gradually. Old names might be retained on a few fine streets.

In a city where the majority oppose complete reform in street nomenclature one might introduce system first in the newer part of the city. Remove names that are as yet memorized by only a few and substitute numbers that would indicate the locality to all, allotting to those streets, of course, the numbers that would ultimately fall to them under complete system. After the merits of system had been seen in use, it might be easy to introduce complete reform, even though it should remove long-cherished names, such as "Banana Street" and "Bummerschein Street" (in Philadelphia).

THE PUBLIC WORKS OF ROCHESTER, N. Y.

The city of Rochester, New York, put its public works engineering into good hands some years ago and the present officers have held their positions and bid fair to hold them indefinitely, because of the good service they have been doing. Through the courtesy of City Engineer E. A. Fisher we are able to present some account of recent work and work now under construction, and through the John P. Smith Printing Company, of Rochester, we can illustrate the descriptions with drawings and photographs.

The new Cobb's Hill reservoir is a very interesting structure which is now under construction.

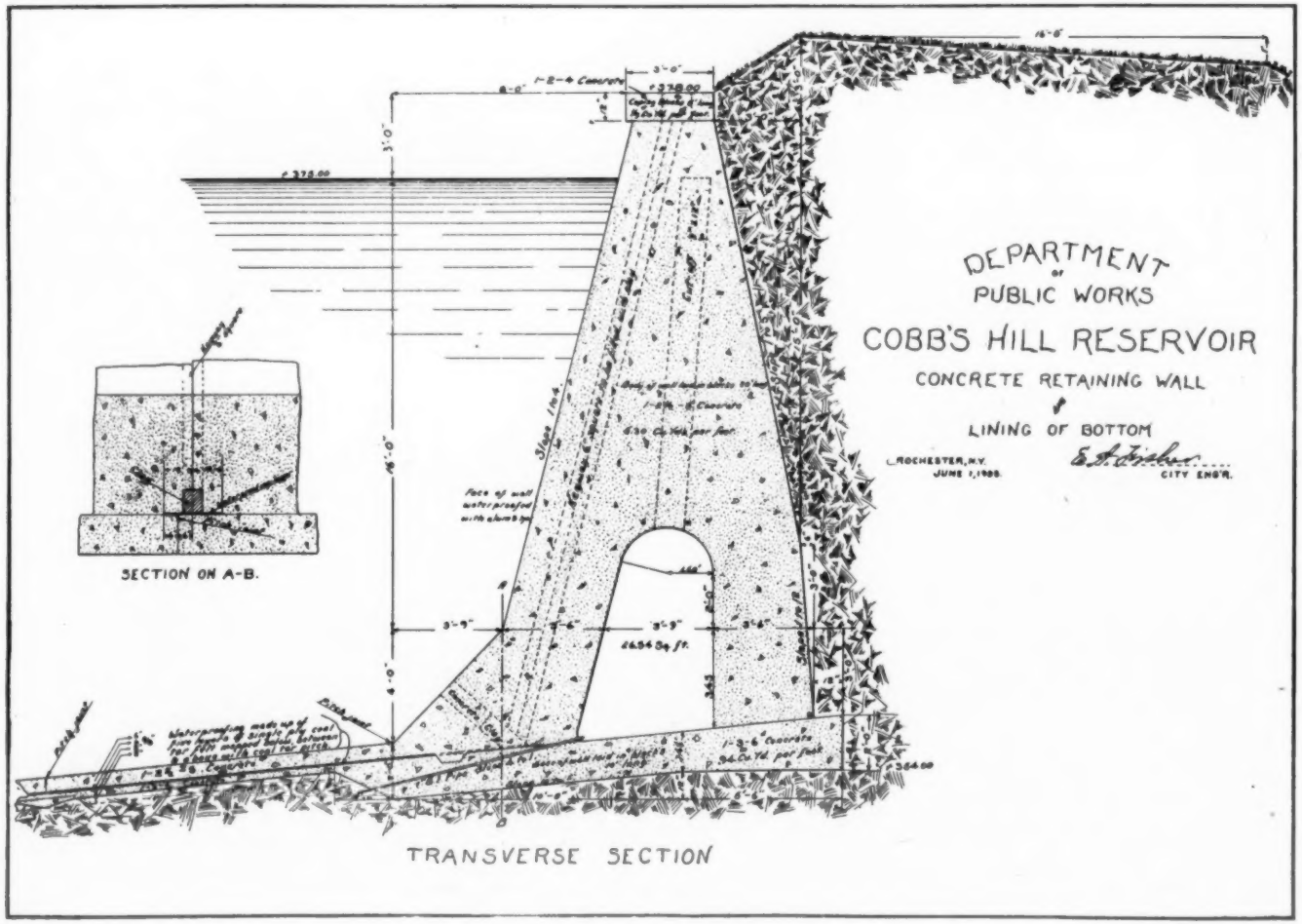
The reservoir is to be used in connection with the present 2½ million gallon Mt. Hope distributing reservoir, which lies on the same range of hills a mile and a half to the west. It will be at the same elevation as the present reservoir.

The material to be excavated is largely sand and gravel. This will be screened and used in the concrete. Water is being provided for construction from the city mains.

The depth of water carried in the reservoir will be 25 feet. The depth at the foot of the retaining wall will be 20 feet, thus saving a considerable mass of masonry in the base of the wall.

All of the excavated material will be deposited on the property, over half of it being placed in an abandoned sand-pit just north of the reservoir. The earth will be handled with steam shovels and cars. The top soil has been stored and will be replaced upon the completed banks. It was removed by grading machines and scrapers.

The retaining wall shown in the accompanying drawing, Plate I, will be built on a concrete foundation laid in blocks 10 feet long, and will itself be laid in blocks 20 feet long and coped with blocks 5 feet long, all built in place. Through the entire length of the wall, which is about 3,600 feet, runs a passage 7 feet high, which will allow of the inspection



I. COBB'S HILL RESERVOIR, ROCHESTER, N. Y.
Section of Wall and Floor.

of the interior. A tell-tale pipe is inserted in each wall block, so that leakage through the reservoir bottom near the wall may be discovered before serious washing of the underlying sand occurs. The joints between the wall blocks are to be made water-tight by the insertion of a key way 6 by 6 inches square, which will be filled with puddled clay. Leakage through these joints may also be discovered by inspection in the central passage.

The bottom of the reservoir will be constructed of a lower layer of concrete laid continuously, and 3 inches thick, except under the joints in the upper layer, under which lines it will be increased to 6 inches, and steel reinforcement will be inserted for a width of 2 feet. A water-proofing layer will then be applied, consisting of five layers of single-ply coal tar felt, each layer being mopped with hot pitch above and below. Upon this water-proofing will be laid the upper layer of concrete in 12-foot squares 6 inches thick. The upper part of the joints will be one-half inch wide and be poured with hot paving pitch.

It was deemed expedient to adopt the above measures to avoid leakage, as dependence must be placed upon the lining and walls alone for water-tightness, on account of the porous character of the material of which the hill is composed.

The reservoir will be supplied by a 36-inch cast-iron pipe conduit about 6,000 feet long, to be constructed in Pinnacle Avenue, Highland Avenue and Monroe Avenue. At the present time 1,900 lineal feet of this pipe have been laid.

Two 36-inch mains will connect the reservoir with the city distribution system.

A by-pass house will be erected at the foot of the hill on the Monroe Avenue side. This will contain three 36-inch guard gates and two 24-inch gates, by means of which the water from the conduit may be by-passed directly to the city without entering the reservoir.

The gate house proper will be located at the west end of the reservoir; the substructure which contains the gates, screen walls, and overflow chamber being constructed in the embankment and forming a portion of the retaining wall of the reservoir. The central passage through the retaining wall will terminate at the gate house.

The gate vault will contain three hydraulically operated 36-inch gates, two screen wells with a gross screen area of about 144 square feet, and an overflow weir with 12-foot crest. The substructures of the by-pass house and gate house will be built of concrete, the walls massive and the floors reinforced.

The 36-inch cast-iron conduit will pass through the gate house and above the reservoir bottom to a fountain chamber in the center thereof, in which will be placed, just beyond the fountain branch, a 36-inch gate hydraulically operated from the gate house. The conduit will then extend about 400 feet farther to a submerged inlet, which will discharge 5 feet below high water surface.

It is intended to admit the water through the fountain in the summer and through the submerged inlet in the winter. Circulation is assured, for the outlet is at the west end of the reservoir directly through submerged sluice-gate openings in the front wall of the gate house to the screen wells. The overflow chamber is drained by a 16-inch cast-iron pipe, 3,000 feet long, discharging into the Erie Canal, which is 133 feet below the reservoir.

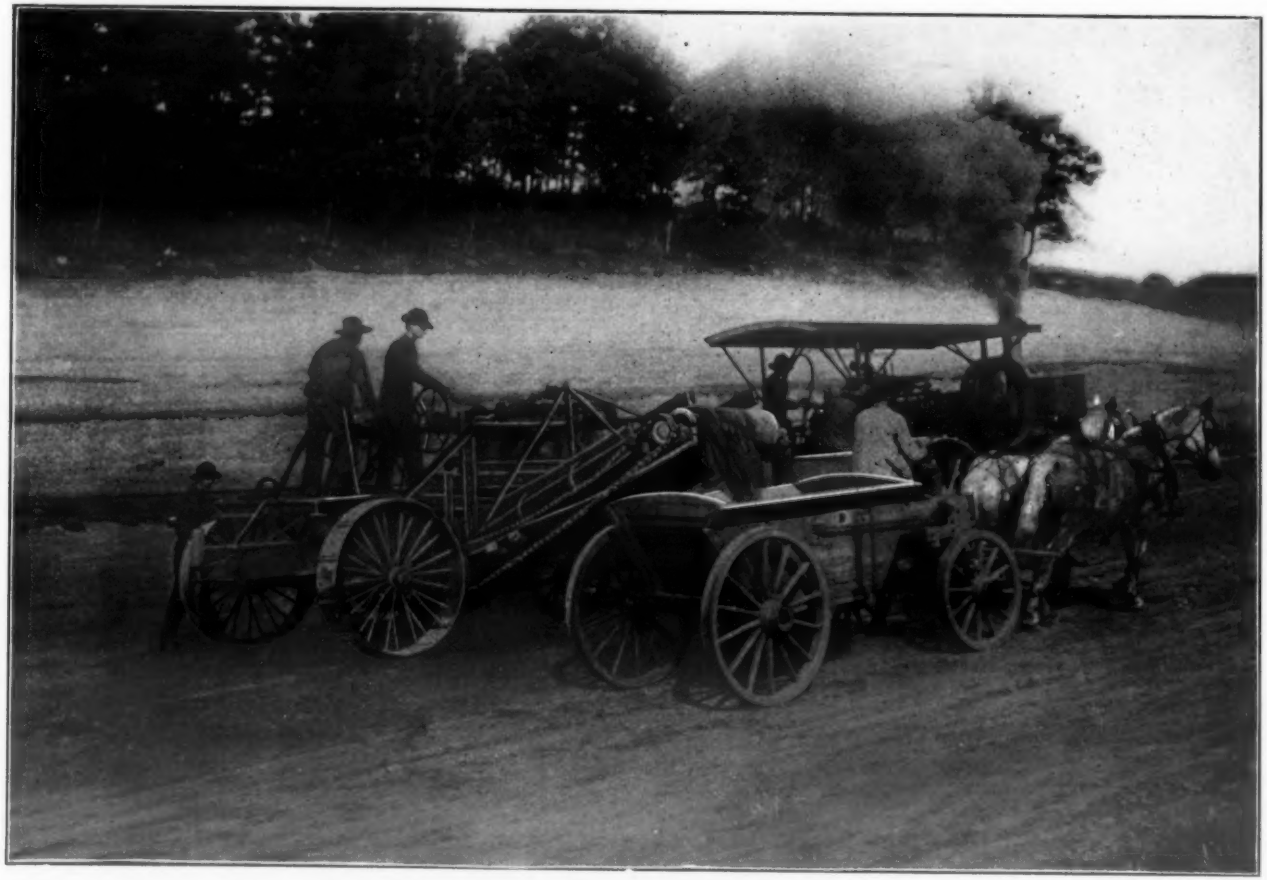
By operating a sluice gate the reservoir can be washed out and slushed into this same waste pipe.

As soon as the contract for the reservoir was awarded the general contractor began assembling a plant. Active operations were begun in September. The top soil has been stripped by a steam grader and wheeled scrapers and stored for use in top dressing the completed embankment. The method of using the grader is shown in Plate II. A Marion and a Thew steam shovel have been employed. One of the shovels is shown in Plate III. The engineer's estimate of the cost of the work was $475,000. The contract price is $390,805.

The work is under the general charge of the city engineer. Mr. John F. Skinner, as principal assistant engineer, made the general and detailed plans for the work. Mr. Frederic P. Stearns, chief engineer of the Metropolitan Water and Sewerage Board, of Boston, Mass., was employed as consulting engineer in the preparation of the plans and specifications. Mr. Willard D. Lockwood is the resident engineer in charge of the construction.

The main source of the water supply of the city for domestic purposes is Hemlock Lake, whose water is brought to the distributing reservoirs named above or directly to the pipe distribution system in two pipe conduits, one of 24-inch cast iron and 36-inch riveted wrought iron pipe and the other of 38-inch steel pipe. The liability of the steel pipe to corrosion was fully studied in 1901 and 1902 and reported upon. From year to year leaks occur, which are patched in the following manner:

After excavating to the pipe a dry pine plug is driven to temporarily stop the flow of the water, said plug being cut off flush with the outside of the pipe. The coating is scraped off clean and the metal



II. COBB'S HILL RESERVOIR, ROCHESTER, N. Y.
Stripping Top Soil with Steam Grader.

dried, after which a coat of mineral rubber is applied.

A sheet lead gasket is then beaten down into contact with the concave side of a steel patch curved to fit the pipe. The patch and gasket are then applied to the pipe and tightly drawn up by means of a two-part band of ½ by 2-inch iron, bolted together. The edges of the lead are then calked and the whole given another coat of mineral rubber.

In some cases where the leak has been near the lap of longitudinal and round seams, or where rivet heads hinder the ordinary procedure, the steel patch is first applied, spaced a short distance from the pipe and the intervening space run with hot lead, after which the edges are calked as before. When, however, the patch has to cover considerable area, due to a series of holes or pitted places which are so continuous as to preclude the use of individual small patches, or where the plate is so weakened as to need a continuous cover plate of considerable size, it is impossible to pour hot lead into the broad thin space below the plate, as it is rapidly chilled by the water in the pipe. In such circumstances an elastic cement sold under the trade name of "Pyrocenit" has been successfully used. This material is furnished in two parts, a powder and a liquid, which are intimately mixed to form a stiff paste. It sets slowly, expands slightly upon setting, and adheres closely to the metal which it is also said to preserve. The liquid which forms a part of this cement does not freeze in our climate. Satisfactory tests have been made with Pyrocenit as a joint material for cast-iron pipes. It is apparently water-tight, and for convenience will be used in future repairs to the steel conduit in place of hot lead.

Two sections of Conduit II were scraped and re-coated during the year; the first, 758.8 feet long on the land of George Hawes, in the town of Richmond, and the second, 454 feet long, on the land of George C. Terry, in the town of Henrietta. Upon the first section four holes occurred prior to the year 1905, and eleven duirng the year, making fifteen in all. Upon the second section one hole occurred prior to the year 1905 and three during the year, making four in all. Thus in re-coating less than 1 per cent of the pipe this year we have covered continuously portions of the line occupied by nearly 2 per cent of all the holes which have thus far developed. It is the intention each year to recoat portions of the conduit where the pitting seems active, thus anticipating leaks in many cases and providing better protection to the metal in these danger districts.

At the present time 3,281.5 feet of conduit has been re-coated, or about 2.4 per cent of the total length of the steel pipe, which is 136,957.54 feet.

Plate IV shows the pitting of the steel plate composing Conduit II.

In a recent volume of MUNICIPAL ENGINEERING the city's public bath house was described. In the rear of this bath house has been constructed the swimming pool shown in Plate V. It is 46 by 80 feet, has concrete walls and a bottom lining of concrete. It is the intention to cover the pool with a permanent construction, thus making it available for use at all seasons of the year. It is one of the largest of its kind connected with any public bath house for all-the-year occupancy.

Plans are also in preparation for an addition to the present bath house to provide suitable and sufficient accommodations for both men and women, also to improve the appearance of the building architecturally, and make it more in keeping with the other municipal buildings.

The number of baths taken at the public bath house in a year has been 72,583, of which 18,146 were women.

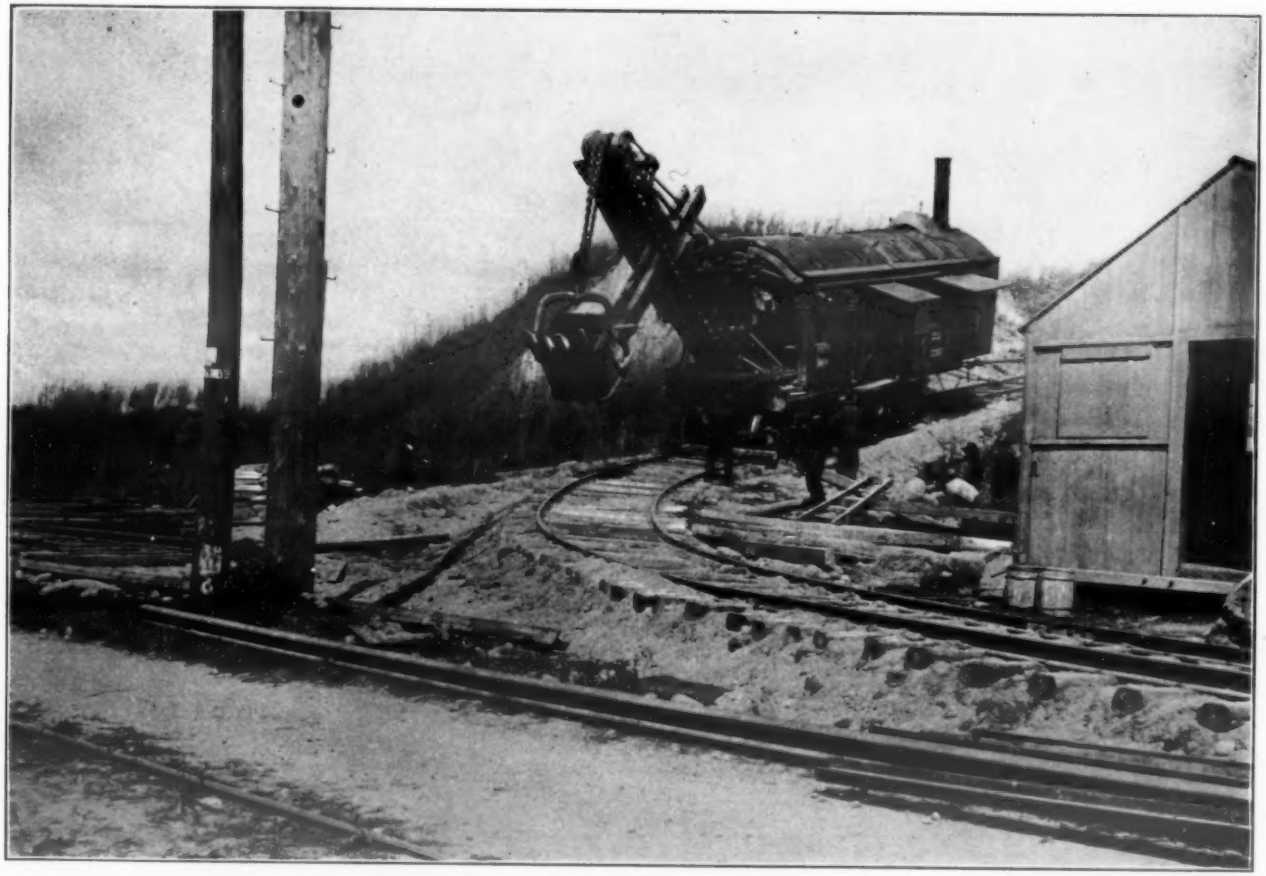
The cost of maintenance of the bath house for a year is as follows:

Fuel and light	$1,017.57
Repairs	338.18
Laundry and soap	494.79
Supplies and insurance	121.66
Attendants	1,522.95
Total	$3,495.15

Rochester has been noted for some years for the efficiency of its street lighting system. Four of the accompanying plates show different styles of lamps used. Plate VI shows the double arc lamps used in profusion on some of the principal business streets. Plate VII shows a single lamp supported on an ornamental post. Plate VIII shows a post which serves at the same time for a lamp post and a trolley pole. Plate IX and X show suspended lamps. The cost of the lighting is shown by the following figures from the last annual report:

There were in use on January 1, 1906, 508 arc lamps arranged in pairs on iron poles, the so-called double arcs, costing 18½ cents per night each, and 2,656 single arc lamps, costing 21½ cents per night each, and 121 gas lamps, costing 8 cents per night each.

There was an increase of six lamps in the double arc system and 183 of the single arc lamps, making a total increase of 189 lamps during the year. There was a decrease of seventeen gas lamps. The total cost for lighting, including incidental expenses, was $236,286.47, being an increase of $9,237.84 over the cost for the preceding year.



III. COBB'S HILL RESERVOIR. ROCHESTER, N. Y.
Steam Shovel Moving Up the Hill.

During the year the work of changing the lamps from open arc current series to enclosed alternating current series was completed, and there are in use 524 direct current constant potential lamps of the Edison System and fourteen enclosed alternating current potential lamps. The d. c. lamps are nearly all of the Manhattan type; the a. c. are the General Electric Company's design. There are now 2,626 enclosed a. c. series constant current lamps. They are all equipped with reflecting shades and show a marked improvement in the diffusion of the illumination of the open arcs which they displace.

BOOKS FOR ENGINEERS.

A committee of the Association for the Advancement of Engineering Education prepared a library list for engineers some years ago. This list is taken as the basis for the following list, which has been gone over by the members present at a meeting of a technical club. As the list is too long for publication in a single number of MUNICIPAL ENGINEERING and is not yet complete, a part of it follows and the remainder will be printed in later numbers as it is completed. Our readers are invited to make additions and to make comments on the books included, and also to say whether they would like to have the list printed in separate form.

EXPLANATORY SYMBOLS.

The publications in this list are designated by the letters A., B., C. and D., to indicate something of the nature of the books and the class of readers for which they are particularly suited. The classification is as follows:

A. Books of elementary nature containing no mathematics and written in the simplest forms; for boys, amateurs and others having not previous knowledge of the subject.

B. Books treating the subject from the popular standpoint and written in such a manner as to be of general interest.

C. Books treating of details of practical application of science and engineering; suitable for city officials or others interested in municipal affairs, manufacturers, mechanics, artisans, students in manual training, and as preparatory for more advanced work.

D. Representative advanced books for engineers, designers, surveyors, etc.

ARCHITECTURE.

D. Berg, L. de C., Safe Building. Two Volumes. $10.00. Intended for architects and engineers, containing construction formulae for strength and numerous worked examples.

C. D. Birkmire, W. H. Architectural Iron and Steel and Its Application in the Construction of Buildings. $3.50. Contains much valuable information.

C. Birkmire, W. H. Planning and Construction of High Office Building. $3.50. An excellent work on steel frame structures and the different methods of fireproofing them.

D. Birkmire, W. H. Skeleton Structures. $3.00. An early book on steel frame buildings; of some value still.

B. C. D. Briggs, W. R. Modern American School Building. $4.00. A good general work on large school buildings, and their ventilation and warming.

C. D. Buhlman, J. Architecture of Classic Antiquity. Germany. $18.00. With English text. A fine collection of architectural motives taken from Grecian, Roman and Renaissance architecture; very valuable to architects, draftsmen and students.

C. D. Building Trades' Pocket Book. Flexible morocco. Net, $1.50. An excellent work for architects and builders, up-to-date, published in connection with the text-books of the International Correspondence School.

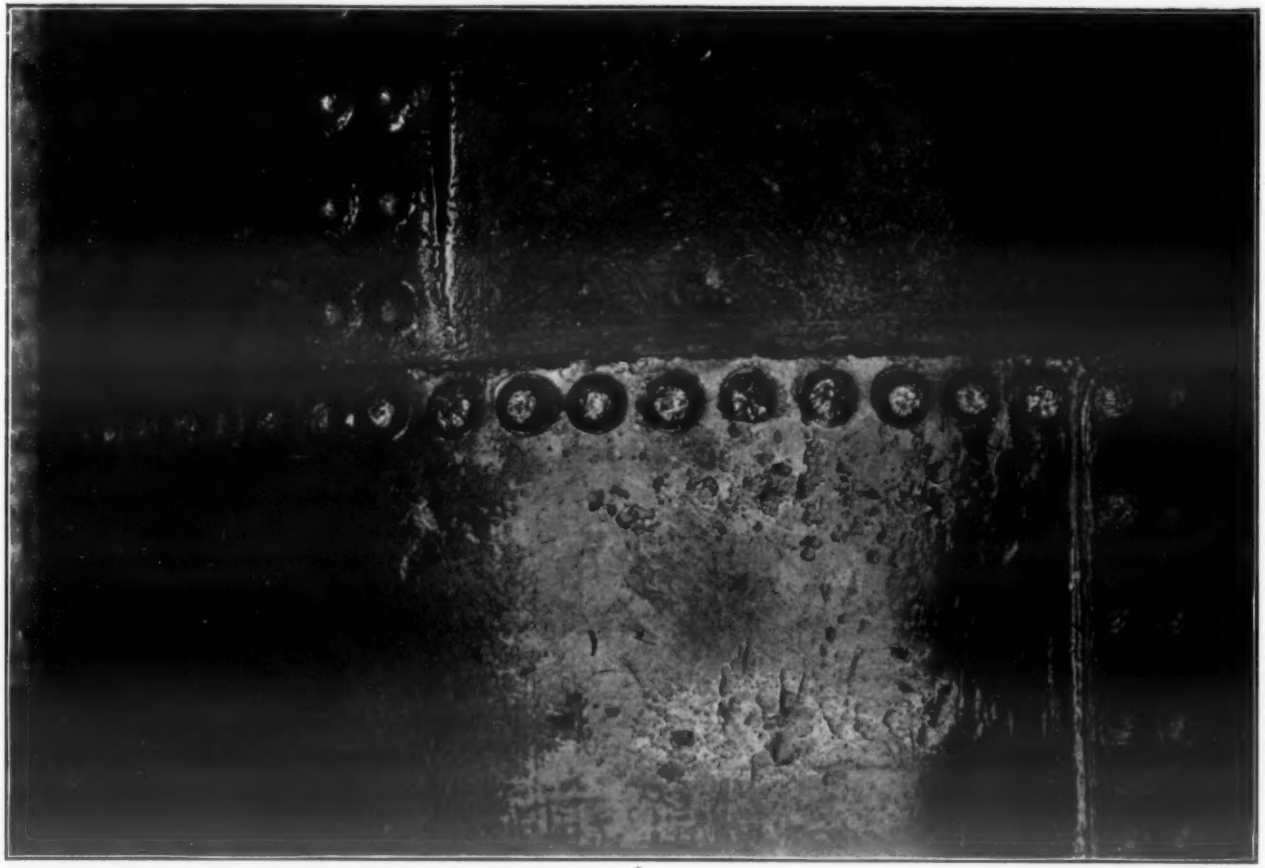
B. C. D. Carpenter, R. C. Warming and Ventilation of Buildings. A manual for heating engineers and architects. $4.00. Best general treatise on the subject, valuable for general reading by owners and for specialists. Good text-book.

B. C. Clark, T. M. Architect, Builder and Owner Before the Law. Net, $3.00. A general statement of the principles of law applicable to the erection of buildings, intended to keep the laymen out of difficulties.

B. C. D. Clark, T. M. Building Superintendence. Revised edition. Net, $3.00. Good book for owners, architects and superintendents of the construction of buildings.

B. C. D. Cummings, C. A. History of Architecture in Italy. Two Volumes. Net, $7.50. Best history of the development of Christian architecture in Italy from its beginning to the opening of the Renaissance period. Fully illustrated.

B. C. D. Fletcher, B. F. History of Architecture. Fourth edition. London.



IV. WATER-WORKS CONDUIT, ROCHESTER, N. Y.
Pitting of Steel Plate in Conduit II.

Net, $4.40. The best text book for serious students of architecture and readers, architects and advanced amateurs and travelers. 240 plates of photos and details; very concise treatment; rather dry for general readers.

D. Freitag, J. K. Architectural Engineering. $3.50. A very complete and thorough treatment of the construction and fire-proofing of steel frame office buildings.

D. Freitag, J. K. Fire-Proofing of Steel Buildings. $2.50. A good work on different systems of fire-proofing buildings.

B. C. Hamlin, A. D. F. History of Architecture. $2.00.

B. C. Holt, R. B. Rugs, Oriental and Occidental, Antique and Modern. A book for ready reference. Net, $3.50. Description and colored plates of rugs from different countries. Descriptive circular sent on request.

D. Ketchum, M. S. The Design of Steel Mill Buildings. Net, $4.00.

D. Kidder, F. E. Architects' and Builders' Pocket Book. Flexible morocco. $5.00. Largest architects' pocketbook.

C. D. Kidder, F. E. Carpentry. $4.00. Comprises carpentry and joinery of buildings.

B. C. D. Kidder, F. E. Churches and Chapels. Net, $3.00. Best practical work on the planning and arrangement of churches, with Sunday school rooms, etc. Many examples.

C. D. Kidder, F. E. Mason's Work. Being Part I of "Building Construction and Superintendence." Net, $3.00. A good work on these subjects, fo} study and reference.

B. C. Litchfield, F. History of Furniture. From the earliest to the present time. $5.00. A good and fully illustrated popular history of furniture.

B. C. Marquand, A., and Frothingham, A. L. History of Sculpture. $1.50.

B. C. D. Moire, C. H. Development and Character of Gothic Architecture. Net, $4.50. Best description of Gothic architecture and its principles for general and professional readers. Good illustrations.

B. C. Mumford, J. K. Oriental Rugs. Net, $7.50. Many colored plates and good descriptions of oriental rugs from various places of manufacture. This and Holt's Rugs are of exceptional interest to ladies.

B. C. D. Sturgis, R. Dictionary of Architecture and Building. Three vols. Net, $18. A new, fully illustrated and valuable dictionary for reference and also containing many valuable and extended articles for the use of the amateur and professional. Other dictionaries and cyclopedias are out of date, mostly foreign, etc.

B. Sturgis, R. European Architecture. $4.00. An interesting history for general readers, with many good illustrations.

B. C. Van Dyke, J. C. History of paintings. $1.50. Rather brief, but an excellent general work, for general readers, ladies' clubs, art classes, etc.

B. C. D. Wheelwright, E. M. School Architecture. Net, $5.00. Best general treatise on planning and treatment of large school buildings. Author had much experience as city architect of Boston.

AUTOMOBILES.

B. C. D. Hasluck, P. N. The Automobile. 2 vols. London, 1905. Net, $7.00. A practical treatise on the construction of modern motor cars, steam, petrol, electric and petrol-electric. Based on Lavergne's "L'Automobile Sur Route," Special edition enlarged, with 804 illustrations, eight full-page plates and an addendum.

C. D. White, T. H. Petrol Motors and Motor Cars. A handbook for engineers, designers and draughtsmen. With illustrations. London, 1904. Net, $1.40. The volume is intended to provide designers and draughtsmen with reliable formulae and information in a readily accessible form. The formulae given are all results of actual practice and only those which have given good results in use have been included.

B. C. Young, A. F. B. The Complete Motorist. With 138 illustrations. London, 1904. Net, $3.50. An account of the evolution and construction of the modern motor-car, with notes on the selection, use and maintenance of the same, and on the pleasures of travel upon the public roads.

BIOGRAPHY.

Abernathy, J. S. Life and Work of, London. Net, $2.65

American Engineering Competition. Being a series of articles resulting from an investigation made by "The Times," London. $1.00.

Church, W. C. Life of John Ericsson. 2 vols. $6.00.

Gazebrook, R. R. James Clerk Maxwell and Modern Physics. $1.25.

Holmes, E. M. Engineers and their Triumphs. Net, $0.60.

How, Lewis. James B. Eads. Net, $0.65.

Hubert, B. G. Inventors (Men of Achievement.) $1.50.

Judson, I. F. Cyrus W. Field, life and work. $2.00.

MacKay, T. Life of Sir John Fowler. Net, $5.60.

Smiles, S. Industrial Biography, London. Net, $1.25.

V. PUBLIC BATH HOUSE, ROCHESTER, N. Y.
New Swimming Pool Addition.

EDITORIAL COMMENT

Tests of Reinforced Concrete Beams.
The Management of the Panama Canal.
The Cement Trade.
Municipal Ownership Failures.

TESTS OF REINFORCED CONCRETE BEAMS.

The University of Illinois has issued a new bulletin giving the results of the later tests of reinforced concrete beams made in the University Laboratory, under Professor Talbot, and thus collecting them in convenient form. The novelty of the information has been discounted somewhat by earlier publication in other forms of much of it, but this does not detract from the value of the bulletin.

During a recent visit to the University of Wisconsin, the writer found that the results of the continuation of the unique tests which Professor Turneaure inaugurated, together with others, are in process of publication and that they will show some new facts and corroborate and more fully explain some of the earlier results.

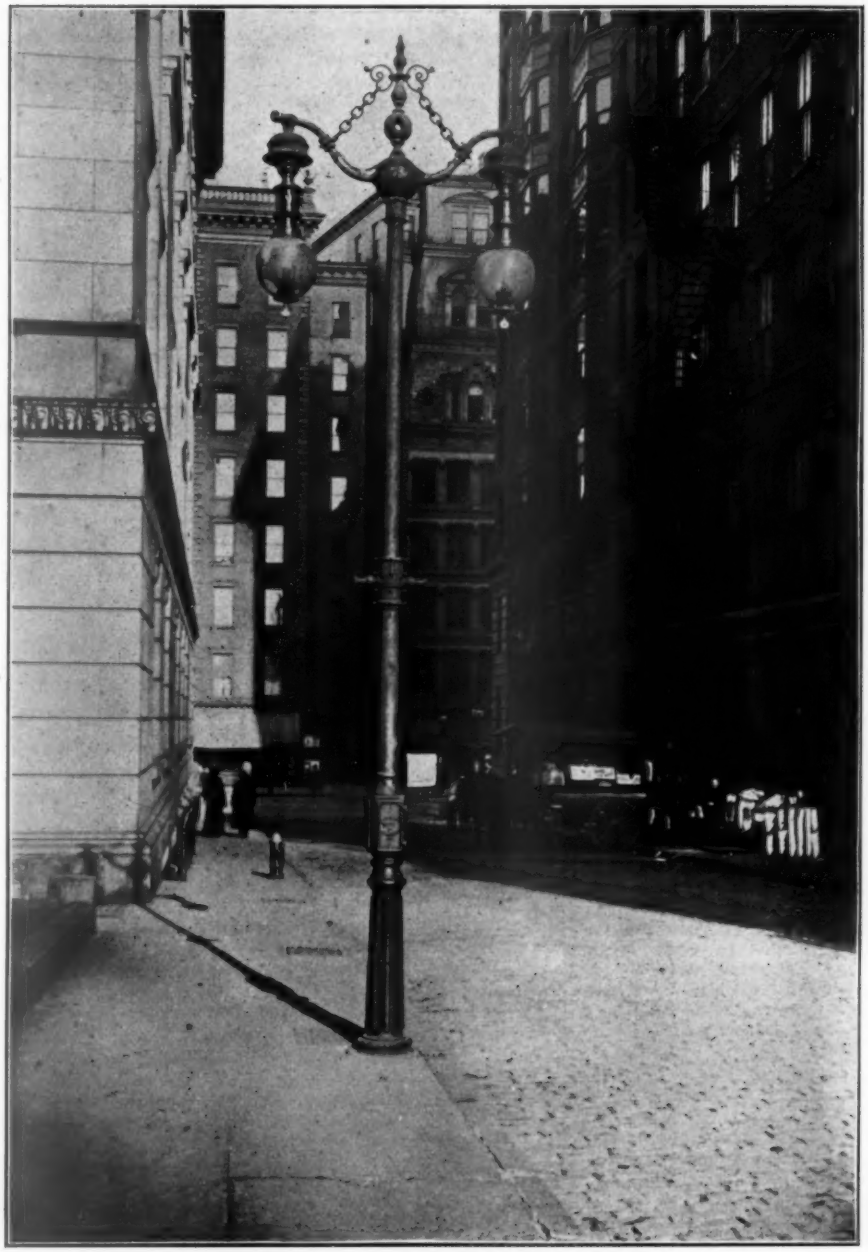
The work of these college laboratories and of some others which have been employed occasionally in concrete and reinforced concrete tests, has given us practically all we know of the action of concrete when reinforced and has been of inestimable value. Each laboratory has attacked some special problem of interest to the professor in charge and the methods of test and study have been developed according to the necessities of the case. Each collection of tests has, therefore, its individuality. And each has demonstrated some theory or given the basis for a theory or has exploded some theory formerly held. A superficial observer occasionally complains that the methods used in the different laboratories are so different that no comparison of results can be made, and it is true that formulae giving considerable variations in results have been developed from the various collections of data.

The truth is, however, that we are much better off in our supply of knowledge than we would have been if all the work had been done under a single authority, even if that authority is a joint committee of several scientific and technical bodies. This is shown by two facts which have recently come to the knowledge of the writer. One of these is the expression of disappointment in the results from college laboratories in a report of one of the committees, which bears the marks of the superficial observation above referred to and also gives evidence, by its lack of agreement with former utterances by some of its members, of lack of conference of the writer of the report with the members of the committee.

Another evidence of the comparative futility of official series of tests may be found in the outline of the first three series of beam tests under way at the St. Louis testing plant of the U. S. Geological Survey. The program for these tests proposes 576 tests of beams, plain and reinforced, and the same number of cylinders and of cubes, with 96 tests for bond and the use of 2,124 mild steel round bars in the reinforced beams. The tests are to be made in triplicate at 30, 90, 180 and 360 days. Granite, limestone, gravel and cinder aggregates are to be used. Three consistencies of mortar are to be tested in the plain concrete beams, various percentages of steel reinforcement are to be used in one set by using different numbers of bars and in the other by varying both number and diameter.

The words "comparative futility" are carefully chosen, for it is evident that this series of tests, when completed, would give a large amount of information regarding the behavior of reinforced concrete under the variabilities of conditions mentioned and that this information would be of considerable value. It is true, however, that even the comparatively small amount of practical work already done in building with reinforced concrete, has given enough experience to discount the value of the information and there will be a still greater discount by the time the series have been completed. And when these three series have been completed there will have been covered only three of an almost unlimited number of series of conditions. Will the present generation of engineers be able to avail themselves of the information? Will the patience of Congress be used up before any large number of the series are completed? The disposition to omit the appropriation altogether or to transfer it to Watertown Arsenal was quite pronounced in the session of Congress just over.

The practical experimenter in the laboratory and the practical engineer who wants results which he can use, alike



VI. ELECTRIC STREET LIGHTING, ROCHESTER, N. Y.
Double Arc Lamps on Main Business Streets.

criticize the program as interminable and not as practical in methods and probable character of results as the present condition of the science of reinforced concrete should have. These criticisms are undoubtedly reaching the committee, as they come from various directions and it is to be hoped that its members will take enough interest in them to bring about an improvement in the program with the practical needs of engineers of this generation in view as the important consideration. The qualifications of those doing the work and having it in direct charge, not alone as to education but as to interest in the work and peculiar adaptability to this sort of investigation, are also most important. Ability to interpret results and to modify methods to procure the desired results, without danger of making tests to suit preconceived theories, is essential all along the line, but especially in the supervisors of the work.

THE MANAGEMENT OF THE PANAMA CANAL.

At last the President has discovered the reason for his difficulties with the operation of the construction force on the Panama canal and has taken the steps which have long seemed to some of those outside the worry of actual contact with the problem to be those most likely to secure ultimate success.

The fact is that, as already stated, the importance of the Panama canal work and its magnitude have been greatly overestimated. A very slight consideration of the work in progress in and about New York City alone will show greater expenditures within the same period of time and upon problems quite as new and strange. These problems are in the hands of various organizations, but some of these organizations have as many kinds of difficulties as are to be found at Panama and all together, they have many more. New York is but a single city. There are others and there are other departments of the U. S. Government fairly comparable, period for period, with the Panama canal. Much of this magnifying of the work would seem to be for effect if the failures in the plans tried did not show that the fault is rather in the lack of proper perspective in the view of the work.

The methods of carrying on government work require many yards of red tape for the protection of the public purse, many more than the railroad men whose services have been specially desired, have been required to use in the work in which they have grown up. Then, too, the training of railroad men in positions similar to those from which the past chiefs of the canal work have been drawn is such as to make them in their particular fields absolute monarchs. It is not surprising, therefore, that they should resent interference with their work by men who are, at least in their opinions, less competent to judge of it than themselves, though their superiors in rank and power. It is only to be expected that they should chafe under the restrictions of the red tape bureau and refuse to be governed by the petty exactions of a $2,500 clerk whose signature must be obtained to every voucher and who must follow the law regarding advertisement for bids, delivery of goods, vouchers for payment, etc.

The Corps of Engineers of the United States Army is a body of highly-educated men who have, by the force of the work put upon them by Congress, been obliged to devise a machine for operating the financial side of the work, which is very nearly perfect in its safeguarding of the funds under their control. These men have grown up under this system, are fully acquainted with its necessary defects in loss of time and increase of cost and are able to operate their machine successfully, when a railroad man, probably past middle age, would not have either time or patience to familiarize himself with it, not to speak of submitting himself to its guidance. It has been the opinion of some engineers from the beginning, therefore, including the writer, that the management of the canal work under government control belonged logically to the Engineer Corps of the United States Army and that there would be great difficulties in the management if placed anywhere else.

The problems of the canal are no greater for the engineer officers than they are for other engineers, and the engineer officers have in the past shown themselves capable of solving, with reasonable satisfaction, all the problems that have been submitted to them, either themselves or through the aid of their under-paid civilian assistants. There is no reason why they should not do equally well with the Panama canal. They will not do the work with the expedition and possibly not with the economy that was expected of the civilian management. But that management has proved not only difficult but practically impossible, so that it now seems certain that the work is not so far along as it would have been if it had been put into the hands of the Corps of Engineers, U. S. A., at the beginning. Success to the work under the present control.

VII. ELECTRIC STREET LIGHTING, ROCHESTER, N. Y.
Single Arc Lamp Suspended from Ornamental Post.

THE CEMENT TRADE.

A preliminary estimate of the Portland cement production for 1906, made by MUNICIPAL ENGINEERING in October, 1906, stated that an increase of nearly 10,000,000 barrels might be expected over the production in 1905. This would make the production 45,000,000 barrels. The actual figures, just reported by the U. S. Geological Survey are 45,610,822 barrels, a fairly satisfactory agreement. There was an increase of about 25 per cent. in the production of puzzolan to 481,224 barrels and a reduction in the production of natural hydraulic cement of about 10 per cent., to 3,935,275 barrels. The total production of all kinds of cement in 1906 was practically 50,000,000 barrels, valued at $54,000,000.

The production of cement per capita of population was 206 barrels, as compared with 161 barrels in 1905, and the end is not yet. This production is very nearly the same as the consumption, for the imports during 1906 were 2,321,000 barrels and the exports of domestic and foreign cements 961,000 barrels, leaving an excess of imports of about 1,360,000 barrels, or about 3 per cent. of the domestic production.

The value of the cement produced has also increased. In 1904 the value of Portland cement at the mill was only 88 cents a barrel. In 1905 it was 94 cents a barrel and in 1906 it was $1.12 a barrel. It is not safe to increase the average mill price much above this figure unless there is a corresponding increase in the cost of other building materials, otherwise there will be a closer adherence to the older building materials and a lessening in the demand for cement.

The variation in the prices of cement in various districts is shown by a diagram prepared by D. C. and W. B. Jackson for years 1902 to 1905. Thus in 1905 the average mill price of Illinois cements was $1.127; in Kentucky, Missouri and Kansas, $1.073; in Michigan, $1.053 and in Indiana $1.002. In 1904 the order of states was Illinois, highest, Michigan, Indiana and the three southern states lowest. These figures fluctuate according to local demands.

There is similar activity in foreign cement markets. Thus in Canada there were 1,541,000 barrels made in 1905 and 2,152,000 barrels made in 1906, an increase of 40 per cent. and the average price at the mill was $1.42 in 1905 and $1.49 in 1906. Imports decreased in 1906, being 694,505 barrels as compared with 917,558 barrels in 1905, so that consumption increased by about 25 per cent. as in the United States. In Germany the improvement in the trade is shown by the dividend statements, the average dividend of 30 large works being 8.5 per cent. in 1905, and 10.7 to 11.4 per cent. in 1906. English trade conditions are not so rosy, though there is some increase in trade in its domestic cements.

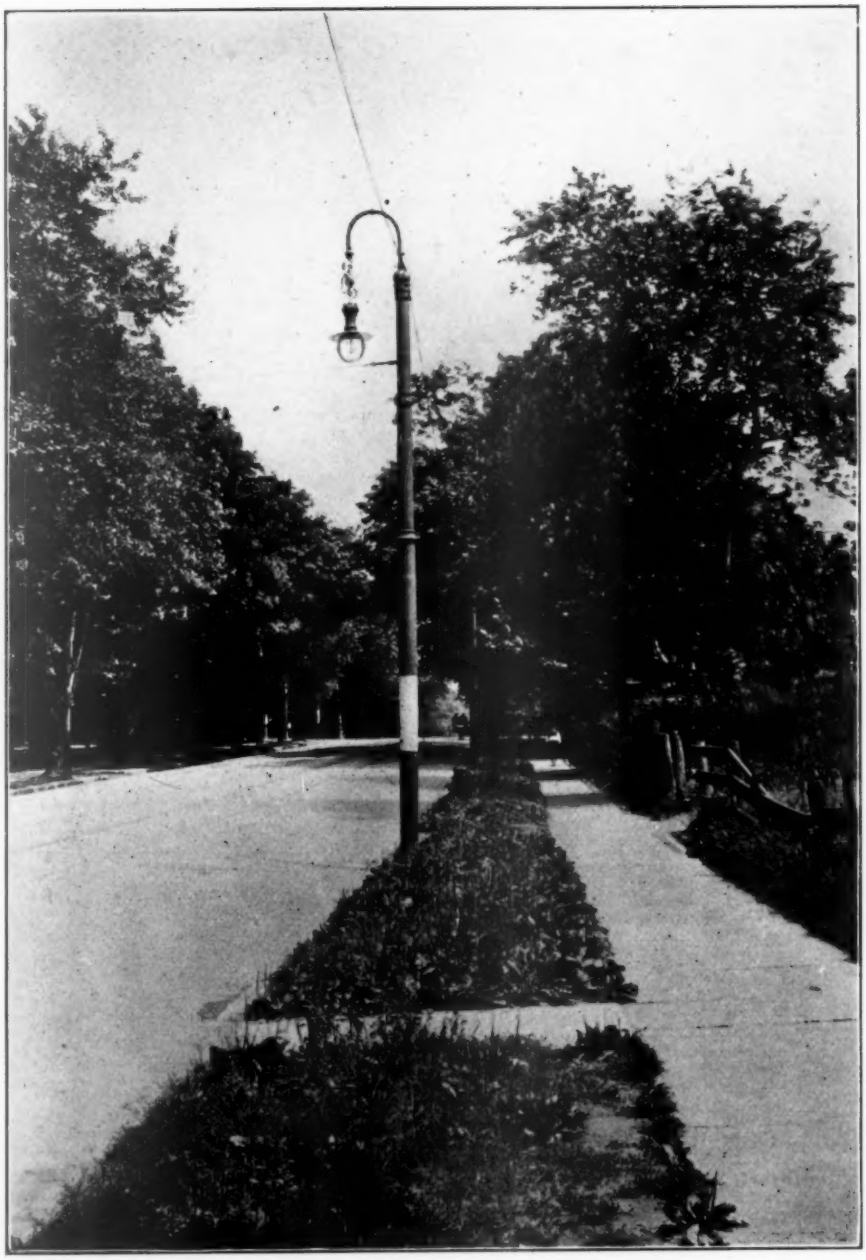
MUNICIPAL OWNERSHIP FAILURES.

It is interesting to note the strong efforts which are made by certain periodicals more or less closely related to financial leaders, to advertise the failures which occur in municipal operation of public service industries.

And now comes *Public Service*, apparently a new periodical, although the number just received is called vol. ii, no. 1, which is devoted almost exclusively, if one may judge from the one number, to this object. Some of these papers go so far as to suppress all facts not favorable to their point of view, thus giving biased accounts of the proceedings, and all of them carefully refrain from mention of failures in private ownership of public service industries.

While such one-sided accounts may have their effect for a time, the lack of justice in them is bound to show sooner or later and the result is the fluctuations in public opinion on this subject which have so much influence in unsettling conditions and making hard times for both public and private owners, particularly the latter. As usual, the truth lies somewhere between the two extremes and a well-balanced, fair investigation of the facts in each case will show where it is located. The truth is, there is incompetence in management on both sides; there is nepotism on both sides; there are political employes on both sides; there are defalcations on both sides; and it is quite possible that if the whole truth were known there is practically as much of each on the one side as on the other.

By our system of doing business in the dark with private owners of public service corporations, we make it possible for them to make more money than the city is able to make from its own plant, operated in the open and by men seeking their own political advantage. What the private owner makes from the patrons of his plant the city must often make up directly from its own treasury, although there are many instances of overcharging of patrons among city plants also. What is needed is not so much municipal ownership as publicity of accounts of public service corporations. In these days a city goes into the discussion of a new contract with a public service corporation with blind eyes and with the officials in a dark room, so that the re-



VIII. ELECTRIC STREET LIGHTING, ROCHESTER, N.Y.
Combined Lamp Post and Trolley Pole.

sulting contract is only by accident entirely equitable. Were the contracts made in full knowledge of the results of the operation of the company, better terms could often be made for both sides, certainly the contracts could be made more easily, and the suspicions of undue influence would not be so numerous. If the contracts were approved by an expert state authority before they became valid, there would be sufficient check from every side. This looks better than municipal ownership, sometimes, if not always. Where it has been tried it has been quite successful. Why not try telling the truth, the whole truth, and nothing but the truth for a while?

THE QUESTION DEPARTMENT

MUNICIPALITIES OWNING PUBLIC UTILITIES.

Have you any compiled data on municipal ownership, giving names of municipalities owning and what public utilities owned in the United States and abroad?
H. C. B., Chattanooga, Tenn.

The "Municipal Year Book" ($3) gives statements regarding the public or private ownership in municipalities of more than 3,000 population, of waterworks, sewers, electric lights, gas works, street railways, telephones, central heating, ferries and wire conduits.

Bulletin No. 20 of the United States Census Bureau gives a table of data regarding waterworks, gas works and electric light plants owned by cities of over 25,000 population.

Albert Shaw's book on "Municipal Government in Continental Europe" and "Municipal Government in Great Britain" and Meyer's "Municipal Ownership in Great Britain" give names of many foreign cities which own one or more of their public service industries.

INFORMATION ABOUT DUSTLESS ROADS.

Being engaged in the composition of a scientific work upon dust and its elimination from macadamized streets in civilized countries, it is of the greatest importance to me that I secure information concerning the methods of elimination of street dust used in America, such as oiling and tarring of streets, tar macadam and bitulithic pavements, etc. I will, therefore, be very thankful to you if you would have the kindness to inform me regarding literature which has appeared upon the subject, monographs, papers and articles in periodicals, with exact prices of the same. With reference to the articles and descriptions appearing in periodicals, it would be most satisfactory if I had these only and not the full annual volumes of the periodicals. The literature may be in either English or German.
———, Chief City Engineer,
———, Germany.

The use of tar and oil and various other dust-laying materials has been so recently begun in America that there are no books upon the subject. Bitulithic and bituminous macadam pavements are not strictly in the class of dust reducers, for they are intended for use in the same class with asphalt, wood or brick in permanent pavements. The treatment of roads with oil, tar, asphalt or chemicals to reduce the dust nuisance is a difficult matter. It is seldom that a permanent pavement can be secured by the methods used in laying dust, and it is necessary to repeat the treatment at intervals more or less frequent, according to the kind of material, method of application, quality of road surface, amount of travel, weather conditions, etc. Since bitulithic and tar macadam are mentioned in the question, the answer will be divided into two parts, one concerning the permanent pavements and the other concerning the methods of treatment for laying dust.

1. Permanent Pavements. The so-called tar macadam is more generally used in England than in America. Some data regarding materials, methods of construction and cost in England will be found in Greenwell's "Roads, Their Construction and Maintenance" (5 shillings), also in Aitken's "Road Making and Maintenance" ($6). Baker's "Roads and Pavements" ($5) contains brief descriptions of bitulithic and various kinds of bituminous macadam pavements in which tar and asphalt are used, as they are laid in America.

The back numbers of MUNICIPAL ENGINEERING contain the best collection of

IX. ELECTRIC STREET LIGHTING, ROCHESTER, N. Y.
Suspended Lamp Before New Police Precinct Station, No. 4.

papers and articles upon these subjects. Following are references to the principal articles which go into detail as to the two kinds of permanent pavements mentioned in the inquiry:

Vol. xxxii; "Tar Macadam in England," p. 193.

Vol. xxxi; "Specifications for Bitulithic Pavements in Indianapolis," p. 101; "Bituminous Pavements Containing Crushed Stone," p. 370.

Vol. xxviii; "Cost of Maintaining Macadam Streets," as compared with bitulithic pavement, p. 242; "Macadam Pavements with Bituminous Binders," p. 489.

Vol. xxvii; "Convict Labor on a Standard Pavement," p. 245; "The Bitulithic Pavement," p. 347.

Vol. xxvi; "The Bitulithic Pavement," p. 117; "Street Pavements," p. 258.

Vol. xxv; "Development of the Bitulithic Pavement," p. 99; "Best Pavement for a Small City," p. 171; "The Construction of Warren's Bitulithic Pavement," p. 325.

Vol. xxiv; "Warren's Bituminous Macadam Pavement," p. 115.

Vol. xxii; "Bituminous Macadam Pavement in Massachusetts," p. 65.

Vol. xxi; "The Development of Bituminous Pavements, Embracing the Use of Coal Tar and Asphalt in Street Work," p. 164; "The Possibilities of the Use of Coal Tar in Bituminous Pavements," p. 285.

Vol. xx: "Coal Tar for Paving Uses," p. 204; "Some Experiments in Laying Bituminous Macadam," and "How to Lay Tar Macadam," pp. 262 and 296; "Tar Macadam as Used in Hamilton, Ontario," p. 323.

II. The following articles treat of methods of making roads dustless:

Vol. xxxii: "The War with Dust" and "Tar on New York State Highways," pp. 73 and 122; "Results and Methods of Coating Streets with Tar in France to Eliminate Dust" and "How to Preserve Macadam Roads," pp. 34 and 57.

Vol. xxxi: "The Use of Tar for Improving Roads" and "Experiments with Oil on Roads," pp. 7 and 33; "Tarred Macadam Highways," p. 83; "Tarred Macadam Roadways," "Dust Laying with Oil" and "Automobiles and Macadam Roads," pp. 181, 191 and 195; "Dust Prevention Experiments in Surrey, England," p. 307; "An Experience in Oiling a City Street," "The Use of Tar on Roads" and "Tarvia, the New Dust Layer," pp. 356, 357 and 415; "Method of Road Tarring in France," p. 463.

Vol. xxx: "Some Experiments on Making Roads Dustless," p. 296; "Experiments on Tarring the Surface of Macadam in Vienna, Austria," p. 438.

Vol. xxix: "The Use of Oil on Macadam Pavements," p. 270.

Vol. xxviii: "Oiled Roads of California," p. 201; "A Tar Macadam Mixer," p. 364.

Vol. xxvii: "Oil on Streets," p. 205.

Vol. xxvi: "Street Oiling Specifications at Bakersfield, Cal.," p. 53; "Road Making in Buxton, England," p. 157.

Vol. xx: "Good Roads and Their Benefits" (oiled roads), p. 28.

Vol. xix: "Oil on Roads," p. 20.

Some chemical solutions and some special preparations of bituminous materials have been used in England, which have not been used, or, if tried, have not been fully successful in America. Reports concerning these materials, as well as fuller reports regarding English methods of using tar may be found in the volumes of *The Surveyor and Municipal and County Engineer*, published in London, England.

BETON—MILK STONE.

We would like to ask if you know or can find out for us what kind of building material Benton is, how made and if it is patented. Is it used in this country? We see it is used extensively in Germany. We would also like to ask how milk stone is made. It is mostly used for celluloid and button manufacture.

F. B. D., Superior, Neb.

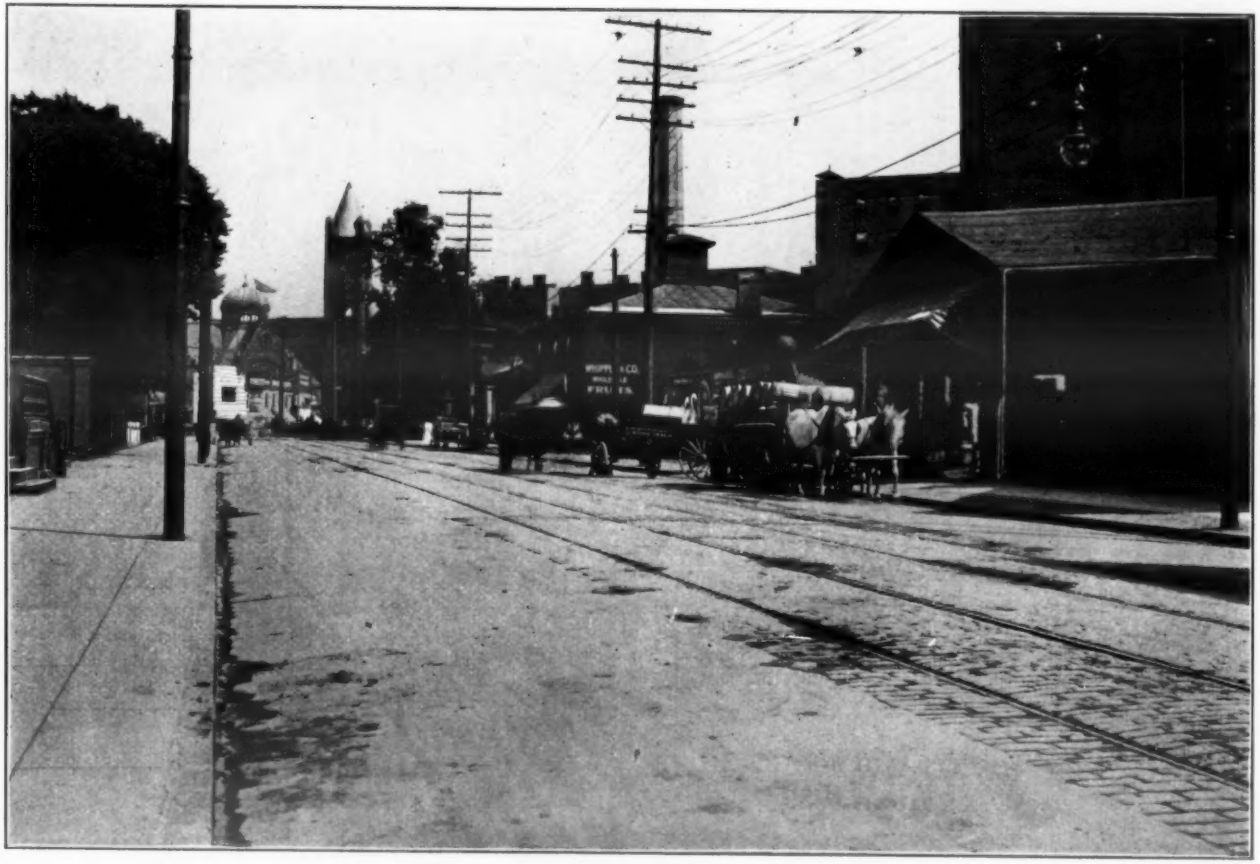
Probably our correspondent refers to beton, which is the name for broken stone concrete used in France and Germany. There are no patents on plain broken stone concrete. Milk stone is a term unknown to the writer. Can any of our readers enlighten us?

MAKERS OF HOUSE NUMBERS.

Will you kindly give me the names of parties manufacturing house numbers? I enclose addressed envelope for reply.

F. M. C., Galesburg, Ill.

Following are names of manufacturers of street signs and house numbers: Pacific Sign and Enameling Co., 219 E. 4th St., Los Angeles, Cal.; Baltimore Enamel and Novelty Co., W. Allen St., Baltimore, Md.; Ingram-Richardson Mfg. Co., Beaver Falls, Pa.; Burdick Sign Co., 52 State St., Chicago, Ill.; Enameled Steel Sign Co., 18 State St., Chicago, Ill.; Jas. Murdock, Jr., Longworth St., Cincinnati, O.; American Street Sign Co., Clyde, O.; Dayton Stencil Co., Dayton, O.; American Steel House Co., 796 11th Ave., New York City; Trevor F. Jones & Co., 374 Broadway, New York City; D. Elmer Roberts, Racine, Wis.; Patrick & Co., 111 Sansome St., San Francisco, Cal.; Wadsworth Engraving Co., Springfield, O.; Arcade Mfg. Co., Freeport, Ill.; Nicol & Co., 57 W. Washington St., Chicago, Ill.; Enameled Iron Co., Beaver Falls, Pa.



X. ELECTRIC STREET LIGHTING, ROCHESTER, N. Y.
Suspended Lamp Over Asphalt and Medina Block Pavement.

CAUSE OF AND REMEDY FOR RAPID WEAR OF CEMENT FLOOR.

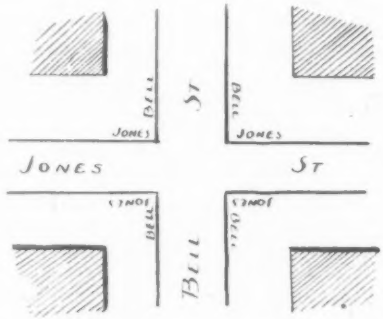
I had a cement floor in a warehouse. It is in a warm place. It forms a dust from walking over it, that is, it seems to wear off. Can you tell me of anything that I can put on cement floor to prevent this dust forming? There is no reason that this should do this, as the cement was mixed 2 to 1, Lehigh Portland. Do you know if cement is likely to powder off when laid in a warm place? I believe it is from the sand, which is a silica sand.
L. C. P., Lancaster, Pa.

Possibly the powdering of the surface is due to the sand, but it is more likely to have been caused by neglect to supply sufficient water during the time of setting of the cement. Concrete exposed to air or warmth loses water by evaporation and if this water is not replaced by sprinkling, the chemical action of the cement is interfered with and the crystals do not form properly. Consequently the set is incomplete and the cohesion of the concrete is injured, resulting in the powdering of the surface under traffic. Do our readers know of any treatment which will stop this disintegration of the floor? The writer knows of nothing which is a cure except the removal of the old surface and putting on a new one with particular attention to the supply of sufficient moisture. Unless an expert is available, it may be safer to put up with the present inconvenience than to run the risk of a failure to join the new surface to the old base.

LOCATION OF STREET NAME PLATE IN CEMENT SIDEWALK.

There has been some contention here as to the proper location of cement sidewalk name plates, which indicate the street upon which such walk is laid, some contending that should a person be at location on enclosed drawing indicated as starting point and going east along Jones Street on the south sidewalk, when they came to the curb, where it intersects with Bell Street, facing directly east, they should be standing on the name plate "Jones Street," as it is shown in the sketch. Others claim that beginning at the starting point on Jones Street sidewalk and going directly east, when they get to the curb where Bell Street intersects, facing directly east, they should be standing on the name plate "Bell Street," reverse of sketch. Parties contending the sketch shows proper location of sidewalk name plates say that should such name plates be nailed to post or fences, then the reverse of the sketch should be used, as the signs would be seen from the streets. These sidewalk signs are put there for guidance of pedestrians mostly and not for parties in conveyances, as they are not sufficiently plain to readily read from conveyances. Where would you put the name of the street in your cement sidewalk?
S. S., ———, Ga.

The name plates should be put in the reverse of the description. The sketch given herewith shows the location which the name plates should have, so that a foot passenger traveling along Jones Street will read the name of the cross street, Bell Street, directly in front of him as he steps onto the curb on the farther side of the street. This is the proper way to put them for the same reason that the street signs on houses



and posts are put in like position. The pedestrian does not care to be reminded at each corner of the name of the street on which he is traveling. What he wants is the name of the cross street, and this he could not get in the position described in the question, without walking out of his way and turning his head or reading the name upside down. Having sidewalk and post signs reversed in position would add a still greater complication.

THICKNESS OF BLOCK WALLS—BOOKS ON CONCRETE CONSTRUCTION.

Will you tell me what thickness must have the foundations (concrete) of a two-story concrete block private house and what shall also be the thickness of the first and second stories? Would it be more economical to reinforce those foundations? What will then be the thickness and what kind of reinforcement shall we use?

I desire to buy a book (well illustrated) that could be understood by one who is not an engineer, on concrete and reinforced concrete, giving prices and mode of construction for bridges, culverts, piers, buildings, foundations, etc. As between "Concrete and Reinforced Concrete Construction," by H. A. Reid, C. E., and "Concrete, Plain and Reinforced," by Taylor & Thompson, which would you advise me to buy?
I. B., Quebec, Canada.

In the March number of MUNICIPAL ENGINEERING will be found the building regulations in several cities for concrete and concrete block buildings. Basement walls in Grand Rapids must be 16 inches thick and block walls of house 10 inches for first story and 8 inches for second story. Other cities allow 12-inch basement walls for one- and two-story houses. Chicago allows 10-inch block walls under frame one- and two-story cottages where the ordinance requires 12-inch brick. Reinforcement would probably not be eco-

nomical in a basement wall for such houses. There must be a certain amount of weight and thickness and the reinforcement would not diminish this enough to offset its own cost.

It is probable that Reid's book would be the more readily understood by the reader who is not an engineer. It is a compilation of brief descriptions with small illustrations of recent practice. Taylor and Thompson's book takes up the subject from the engineer's standpoint and also contains some valuable descriptions of works in which concrete is the principal material.

MATERIAL FOR CONCRETE BLOCKS —PLASTERING ON BLOCKS.

I am thinking of building a concrete block house and would like a little information, viz.: Which is the best, crushed limestone, gravel or sand? What is the proper proportion? Should I use crushed stone? Is it necessary to lath over the blocks before plastering?

B. T. C., Higginsville, Mo.

The following regarding the materials of which to make concrete blocks is from a paper by S. B. Newberry, published under the title "Concrete Building Blocks" by the Association of American Portland Cement Manufacturers. Part of the paper was published in MUNICIPAL ENGINEERING, vol. xxx, p. 253.

"In the making of building blocks the spaces to be filled with concrete are generally too narrow to permit the use of very coarse material, and the block-maker is limited to gravel or stone not exceeding ½ or ¾ inch in size. A considerable proportion of coarse material is, however, just as necessary as in other kinds of concrete work, and gravel or screenings should be chosen which will give the greatest possible density. For good results, at least one-third of the material, by weight, should be coarser than ⅛ inch. Blocks made from such gravel or screenings, 1 to 5, will be found as good as 1 to 3 with sand only. It is a mistake to suppose that the coarse fragments will show on the surface; if the mixing is thorough, this will not be the case. A moderate degree of roughness or variety in the surface of blocks is, in fact, desirable, and would go far to overcome the prejudice which many architects hold against the smooth, lifeless surface of cement work. Sand and gravel are, in most cases, the cheapest material to use for block work. The presence of a few per cent of clay or loam is not harmful, provided the mixing is thorough. Stone screenings, if of good quality, give fully as strong concrete as sand and gravel, and usually yield blocks of somewhat lighter color. Screenings from soft stone should be avoided, also such as contain too much dust. This can be determined from the weight per cubic foot, and by a sifting test. If more than two-thirds pass ¼-inch, and the weight (well jarred down) is less than 120 pounds, the material is not the best."

The exact amount of cement is not stated in the above extract, because the proportion to be used depends on the amount of voids in the material used. These voids can be roughly determined by measuring the amount of water necessary to fill a box already filled with the stone or gravel and sand. A method of doing this is given in the March number on page 149 in an article by Louis H. Gibson on "A Normal Concrete." It will not be far from the proportion stated above.

If the blocks are made waterproof by using the proper quantity of cement or by the use of efficient waterproofing compounds, and the wall is properly ventilated so as to prevent condensation of moisture on its inner surface, lath can be omitted. Plaster directly on the wall is damaged by water coming through the wall and by water condensing on it when the wall is cold and the room is filled with damp air. Waterproof blocks and proper temperature of wall are both, therefore, to be striven for. The accompanying cut shows a house which was plastered on the blocks directly and has been entirely satisfactory. The method of making the blocks for this house is described in the March number of MUNICIPAL ENGINEERING, page 164, in the article entitled "The Use of Waterproofing in Concrete."

EFFECT OF FROST ON CONCRETE PIPE.

Can you give me any definite information on the effect of frost on concrete pipe? The city is anticipating the construction of a gravity water pipe line. I have been talking concrete pipe, but the question of the effect of frost on the pipe has been held against me. Thus far I have not been able to procure definite information on the question from people who have had experience with concrete pipe under conditions similar to those prevailing here. The pipe line is a gravity line with a grade of approximately 15 feet to the mile. Soil is thin and, therefore, the plan is a shallow trench which will give only about 6 inches of soil on the top of the crown of the pipe when laid. The line will be from 5,000 to 6,000 feet above sea level. The ground is sometimes watersoaked from the fall rains when the first hard freeze comes. The soil freezes from a few inches to possibly 12 to 15 inches deep before the snow falls much. At that season (fall) the pipe will be only partially filled with water.

The question is, What will be the effect of frost on a concrete pipe partially filled with water flowing at a slow velocity, approximately 3 feet per second, and covered with only 6 inches of watersoaked soil and the thermometer below freezing? Any communication from you or any per-

son having had experience with concrete pipe under similar conditions will be much appreciated.

I. L. H., Baker City, Ore.

This question is referred to our readers with request for statements of their experience. Concrete pipe has been used so little, except for sewers, buried well below the frost line, that there may be nothing to report. The only construction under conditions approximating those stated which is known to the editor is the reinforced concrete pipe sewer outlet extension at St. Joseph, Mo., described in MUNICIPAL ENGINEERING, vol. xxx, p. 311, and vol. xxxi, p. 167, the latter article with illustrations. The conditions differ in some important particulars from those stated in the above letter. The latest reports from the St. Joseph sewers are to the effect that they are standing the present conditions satisfactorily.

There are three ways in which frost might seriously interfere with the pipe. The first two would affect all kinds of non-metallic pipe alike, viz., heaving the pipe and breaking joints or pipes on account of the shallow depth of earth on the top; and collecting ice on the inside of the pipe until finally the water is frozen solid and possibly bursts the pipe. The other difficulty, the disintegration of the pipe by the freezing of water absorbed by its walls, is one which can be obviated by making the concrete waterproof in one or more of the ways discussed in this department almost monthly and in frequent articles.

ARE HOLLOW WALLS FOR VENTILATION OR DEAD AIR SPACE?

In response to the inquiry under the above heading in this department in the March number, the following has been received:

Both are necessary to the completeness of a building, especially a residence. If we have a dry building, we must have two walls as nearly as practical, using only the amount of space in bonding necessary to the integrity of the building. By using registers at base and openings at the top of wall, allowing air to pass out through comb of roof, we have a complete system of air circulation. This will do away with heated upper rooms during the hot season. And by placing registers near ceiling or opposite side to hot-air register we have air circulation in every room. These registers should be made to open and close and should be closed outside during the cold weather, so that the desired temperature can be more readily maintained. Enclosed find brief and etching of a system of construction that I have demonstrated to be thoroughly practical, having put up a piece of work for one of our leading architects. While portions of the plastered walls are below grade, he says they are dry and has endorsed the system as a positive success.

JAMES THOMAS, Tacoma, Wash.

The circular to which Mr. Thomas refers describes a method of making continuous concrete walls with ventilating air space both vertical and horizontal and forms for the work. In his letter he states that both ventilation and dead air space are necessary, but describes only the method of securing thorough ventilation. The closing of the registers during cold weather gives an approach to dead air space, but there is undoubtedly leakage enough to give some degree of ventilation at the same time that much of the economy of dead air space in respect to heating is secured. Further reports from our readers are requested.

CONCRETE BUILDING BLOCKS.

I am about to erect 100 houses entirely out of concrete blocks in Brooklyn, such as one- and two-family houses, to be two stories and cellar. This process of building is entirely new in Brooklyn. I have bought a machine to make concrete blocks, also a mixer and other materials which I may require, and intend to make the blocks on the premises of the buildings. I was recommended by the company that sold us the machinery that you can supply us with any information required regarding the manufacture of concrete blocks. We would like answers to the following questions:

1. What cement would be preferable for one- and two-family house?
2. What mixture of material, such as cement, sand, gravel, etc., would you require to make blocks for rear and gables, sizes to be, say, length 32 inches, height 6 to 8 inches, and width of block from 10 to 16 inches?
3. What mixture would you require for front of houses to make the blocks and ornamental works, the color and imitation of limestones?

We intend to start operations at once and would like to be fully prepared.

J. G., Brooklyn, N. Y.

1. Nothing but the best Portland cement should be used. There are many good brands on the market, and almost any true Portland cement from Eastern mills should be satisfactory. There are some natural cements and some "improved" natural cements which sometimes masquerade on the market as Portland cement, but almost any well-established brand will be acceptable if properly inspected.

2. Reference may be made to the answer to another question in this department this month under the heading "Material for Concrete Blocks" for the method of choosing materials and mixture for cement blocks recommended by S. B. Newberry, who is high authority upon this subject. The blocks for walls not exposed to view may be made less carefully, but it is quite as essential that they be waterproof, and the same care must be taken with proportions and mixture and thoroughness of tamping.

3. For the outside walls, especially fronts, a facing of special material may be used. If imitation of limestone is desired, limestone screenings and finely crushed limestone may be used with

proper amount of cement and used as a facing, the tamping of facing and backing of blocks being done together, so as to insure that they form one solid block. Waterproofing is often used to advantage in the mixture for the blocks, as described in this number of MUNICIPAL ENGINEERING, as well as in several preceding numbers. The use of a white Portland cement, one brand of which is on the market and others are promised later, will add to the beauty of the work in the natural colors and also make any desired tint obtainable if coloring matters are used.

The back numbers of MUNICIPAL ENGINEERING for the past four years show the development of the cement block industry, and every volume contains several articles directly applicable to the conditions of our correspondent. The article by S. B. Newberry, above referred to, may be found in part in vol. xxx, p. 253. A pamphlet containing the whole article can be obtained of the Association of American Portland Cement Manufacturers by writing to their office in Philadelphia.

SPECIFICATIONS FOR CONCRETE CURB.

Will you kindly refer me where I can secure a good specification for concrete curb made in place?

SUBSCRIBER, ———, Mont.

Excellent specifications will be found in the "Handbook for Ceemnt Users" ($3) on pages 274, 276 and 277, from which a set suited to the local conditions can undoubtedly be selected. The specifications in use in Indianapolis will be found in MUNICIPAL ENGINEERING, vol. xxxi, p. 25. There is an article on "How to Lay Granitoid Curb and Gutter" in vol. xxix, p. 81. Forms of cross section for concrete curb are described in vol. xxv, pp. 250 and 375.

FORMS FOR REINFORCED CONCRETE GRAIN BINS.

I have the contract for four reinforced concrete grain bins for an elevator 14 by 60 feet in height. Can you tell me of any one who has molds for this kind of work that can be hired, and do you know of any such structures in course of construction? E. J. W., Paxton, Ill.

J. H. Sullivan, Grand Rapids, Mich., has a plank holder that might be of assistance in this case. So has Thos. C. Farrell, Washington, N. J. The Concrete Sand and Stone Co., Youngstown, O., has a form for concrete walls. Perhaps the Collapsible Centering Construction Co., 27 Alexandrine Avenue, Detroit, Mich., could supply the needed forms. Rudolph S. Blome Co. are contractors who could probably give some information. They are in the Unity Building, Chicago, Ill. Can our readers make any suggestions that will help our correspondent and refer him to bins now in process of erection?

SPECIFICATION FOR MAKING MACADAM ROAD.

We should like to know what you consider the best method for making a road out of crushed rock where a steam roller is available.

W. M. L., Manistique, Mich.

The following excellent specification will be found in Byrne's "Highway Construction" ($5):

"The subgrade surface shall be truly shaped and trimmed to the required cross-section, then rolled with a roller weighing not less than 300 pounds per inch of run. The rolling will be continued until the surface has become firm and hard; in no case shall it be less than 5 hours per 1,000 square yards. Such parts as cannot be reached by the roller shall be tamped with hand rammers. Water shall be applied by sprinkling in advance of the roller, but an excess must not be used; generally 25 gallons per 1,000 square yards will be sufficient.

"On the subgrade surface prepared as above described, a layer of bank gravel will be spread to a depth of 9 inches and rolled continuously until the depth is reduced to 7 inches; on the foundation so prepared the broken stone will be placed. Its finished thickness will be 8 inches. The stones will be spread in two layers; the first layer will be spread to a depth of 5½ inches and rolled till the depth is reduced to 5 inches; water will be applied in advance of the roller, but not in excess. When the broken stone is so compacted, a layer one inch thick, of clean sand, or sand containing not more than 15 per cent. of loam, will be spread over the surface, and the rolling continued until the stones cease to sink or creep in front of the roller, and the thickness of the layer of broken stone is 4 inches or thereabouts. When the first layer has been finished to the satisfaction of the engineer, the second layer will be spread to the same depth and treated in the same manner as the first layer. The rolling of this surface will be continued until all settlement has ceased."

For less important streets the gravel layer may be omitted, if the subgrade is of good material, making the finished thickness of the macadam 8 inches. It is quite common to make the center of the roadway 3 or 4 inches thicker than the sides, if the traffic is likely to concentrate in the middle of the roadway. In that case the macadam may be, say, 6 inches thick at the sides and 10 inches in the center.

Some gravels make better wearing sur-

faces than soft stone, so that it might be proper to put the broken stone on the bottom and surface with gravel. Whether this would be the case in this instance there are no data given to determine.

Dry soils which are thoroughly drained may permit reducing the thickness of the macadam to 6 inches throughout, but the road surface should be well crowned and repairs should be kept up so that there will be no chance for collection of water in ruts and hollows on the road surface, which will soften the roadway and subgrade and allow wagons to cut through the macadam. The surface must be replaced also as rapidly as it wears away.

Baker's "Roads and Pavements" ($5) has several descriptions of methods of laying and rolling the macadam and applying the material, suited to various conditions, from which may be selected the one most suitable for the locality, in case that quoted above is not entirely satisfactory.

FLOW OF WATER IN PIPES.

I have been looking for some publication, preferably book form, which would answer some questions like these: What would be carrying capacity of 6-in., 10-in., 16-in., etc., vitrified pipe, respectively at different grades, say 10 ft. per mile, 100 ft. per mile, etc., and how to compute same. What effect has an angle upon the carrying capacity of pipe under different pressures? In short, I am looking for a sort of hand-book, or guide.

W. C. D, Moreno, Cal.

Flynn's little book, "Flow of Water in Open Channels, Pipes, Sewers, Conduits," etc, (50c), gives the information desired in tables with instructions as to use of the tables to secure the desired information. There are tables for pipes flowing full and also for pipes flowing under pressure. Freeman's Tables give similar tables and diagrams and also data about resistance of bends.

PRODUCTION OF CEMENT IN 1906.

Please give us the production of cement in 1906.

HAYDEN AUTOMATIC BLOCK MACHINE CO.,
Columbus, O.

The following statement, issued by the United States Geological Survey, shows the approximate production of hydraulic cements in the United States for the calendar year 1906:

This statement is exact within a small fraction of 1 per cent. and is issued in advance of the annual report on the production of cement which is now being prepared in that Bureau. The returns on which it is based are complete with the exception of those from four small plants.

The total production of all kinds of hydraulic cement in 1906, including Portland, natural rock and Puzzolan cements, was 50,027,321 barrels, valued at $54,615,713.

Of the above total amount of cement manufactured in the United States in 1906, 45,610,822 barrels were Portland cement, with a value of $51,240,651; 3,935,275 barrels were natural rock cement, with a value of $2,362,140; and 481,244 barrels were Puzzolan cement, valued at $412,921.

Prices were good in 1906, and showed an advance over those of 1905. The total production of cement in 1905 was 40,894,308 barrels, valued at $36,012,189. Comparison of totals for 1905 and 1906 shows an increase in 1906 of 9,133,013 barrels in production and $18,003,524 in value.

LIST OF PARK SUPERINTENDENTS—ASSOCIATIONS OF BUILDING AND SMOKE INSPECTORS.

We are desirous of securing a list of the park superintendents of the United States, and if you can render us any assistance, or advise where we can obtain such a list, we shall appreciate the favor.

We also wish to learn whether there is a national association, or any association, of building inspectors, and if so, where it is to be addressed. Can you give us any information on this point?

M. E. C., Chicago, Ill.

The "Municipal Year Book" ($3), gives the names of the chief park officer in each city of more than 3,000 population for 1902, sometimes the president of the park commission, sometimes the park superintendent. This is the only list known to the writer.

There is a national association of building inspectors, but the addresses of its officers are unknown to the writer. Mr. Harris, of Toronto, Ont., is secretary of a new and small association of smoke inspectors.

IS MUNICIPAL OWNERSHIP A FAILURE?

Is municipal ownership a failure? If so, why. Do you know of any municipal plants that have failed in the past year? If so, from what cause? I have just heard that the city of Chillicothe, Mo., ed on the 26th to install a municipal electric plant. The private company failed to satisfy the people. Bad service.

G., Independence, Ia.

A brief reply to the first question would be no, because the failures are not due to the principles of municipal ownership, but are due to the bad management of those who control the municipal plants. There are similar failures under private ownership, but they are not so widely advertised. The character of the service also depends upon the character of the management, and you will find reports on the one hand that the service is better under municipal ownership and on the other hand that it is better under pri-

vate ownership. This depends entirely upon the relative merits of the management of the plants in each case. On the whole the tendency is towards more plants under municipal ownership, so far as waterworks and electric plants are concerned. A few plants are transferred from municipal to private ownership, but there are more which are being transferred from private to municipal ownership. In some of the articles referred to in an article on page 98 of the February number of MUNICIPAL ENGINEERING, you will find discussion of this phase of the subject which are based on the principle that the city is a business corporation in which the politician should have no standing as such. The degree of success in carrying on the business of the corporation is proportional to the interest which the voters take in the competency of its officers and their knowledge of what constitutes a good officer. There are cities in which under present conditions municipal ownership could not be recommended, but there are many others in which municipal ownership would probably be the most satisfactory. You can settle this matter for your own city on the basis of the conditions which you find in it and the articles referred to will be of value in fixing the principles on which you should base your discussions of the subject and the collection of information from which to derive your decision.

WATERPROOFING BASEMENTS.

I have been referred to you by the Atlas Portland Cement Company for information as to a means of waterproofing basements in wet, seepy soil, where there is no sewerage and as to the means of waterproofing the New York Subway.

C. R. G., Louisville, Ky.

The method used in the New York Subway is similar to that used elsewhere when the foundation is below the level of the ground water. The specifications are given in Taylor & Thompson's "Concrete, Plain and Reinforced," ($5), from which the following description is taken:

If the soil is dry when the foundation is laid the waterproofing may be laid directly on it. Otherwise a layer of concrete must be laid first, with a thickness of 3 to 8 inches, according to condition of soil as foundation. The waterproofing is laid on this concrete after it has dried out, and then another layer of concrete is put in. The waterproofing is composed of asphalted paper or felt laid as follows: First, the hot liquid asphalt is mopped on the foundation, a layer of asphalted felt or paper is immediately rolled out on this asphalt, a second mopping of asphalt is put on, a second layer of paper, and so on for as many layers as are deemed necessary, the last being a mopping of asphalt. The laying is continuous, the successive layers of paper breaking joint regularly, as many joints to a roll as there are layers. The subway specifications require six layers or more when the head of water is 10 feet and not less than three layers anywhere. The jointing of the paper must be very carefully carried round the corners and up the sides. When the head of water is more than 10 feet, two layers of the felt in asphalt are required with one or more layers of thoroughly dry brick dipped in asphalt between them.

In many cases, hot asphalt thoroughly coating the bottom and the outside of the wall, is sufficient, perhaps with a single layer of paper or burlap, as shown in the article on waterproofing an acqueduct, elsewhere in this number of MUNICIPAL ENGINEERING.

HOW TO FIND CENTER OF IRREGULAR SURFACE.

Please tell me the most practicable method of finding a center of an irregular surface, say like the plat of Kay county. Is the balancing point of a cardboard the shape of the county the proper center as nearly as may be had?

F. E. S., Newkirk, O. T.

The center of gravity can be determined with the accuracy of the scale to which the county is drawn by finding the balancing point of a piece of cardboard of equal thickness throughout cut with sharp clear edges. This is one of the centers of the figure, and probably the one wanted. If there is a survey of the county, giving the courses and distances of the boundary lines, the county can be divided into strips for purposes of computation and the center found exactly by passing axes through or parallel to two long sides and computing the moments of these partial areas about the axes, and dividing the sum of these moments by the total area, thus finding the distances parallel to the axes to the center. This process will give the location within the accuracy of measurement of the lines and angles in the field.

PRICES FOR ELECTRIC POWER.

Can you give me any information through your journal of the prices that are being paid in different localities to hydro-electric companies for electric power sold in considerable amounts to manufacturing establishments?

OLD SUBSCRIBER,
Manistee, Mich.

Can our readers give any exact data on this question? The variation in cost of power is so great that there must be equal variation in price. Perhaps the limits for large amounts may lie between 2 and 5 cents per kilowatt with

occasional exceptions both above and below. What our correspondent wants is probably some statement of the conditions under which the power is developed and furnished as well as the price.

THE HASSAM PAVEMENT.

What is the Hassam pavement? Where has it been laid? Has it given satisfaction? W. B., Minneapolis, Minn.

The Hassam pavement seems to be composed of a concrete foundation laid in a special way and a concrete wearing surface also laid in a special way. The foundation may be used under other pavements as well. Streets have been laid with it in New England and Atlantic coast States. The oldest street is said to be nearly two years old. It is said to be less noisy than brick, not slippery and easily cleaned.

BEST TILE FOR SEWERAGE PURPOSES.

Which is the best kind of tiling for sewerage purposes?

S. S. Lenox, S. D.

The choice of tile for sewerage purposes does not depend so much upon the material of which the tile is made as upon the quality of the tile when made. Ordinarily, vitrified, salt-glazed, clay tile are the smoothest, but the irregularities at the joints in the clay tile may interfere with the flow of the sewage as much as the rougher surface of the cement tile with smoother joints. As to durability and strength, a good cement pipe is better than a poor clay pipe and vice versa. The question of cost may also be important. With equal quality and strength of pipe the cheaper will evidently be preferred. The cement pipe should be made dense enough to be practically watertight. Reference may be made to the article elsewhere in this number on cement sewer pipe for greater detail.

MAKER OF CHEMICAL ENGINES.

This town is considering the purchase of a chemical engine. If you have any list of chemical engine manufacturers, particularly those for use on country roads, please send it to us.

T. H. B., ————, Mass.

Following is a list of makers of chemical engines:

Advance & Fire Appliance Co., Milwaukee, Wis.

Chemical Fire Engine Co., Des Moines, Iowa.

Diggs Fire Extinguisher Co., 141 Center St., New York.

Fire Extinguisher Mfg. Co., 373 Wabash Ave., Chicago.

H. S. Nutting, 13 N. E. 5th St., Minneapolis, Minn.

Rex Fire Extinguisher Co., 152 Center St., New York.

Seagrave Co., Columbus, O.

A. F. & S. C. Stewart, Rochester, N. Y.

Woodhouse Mfg. Co., 50 W. Broadway, New York.

CIVIC BETTERMENT

A Smokeless City—Galveston's City Government—Buy Parks Now.

Steps in the Development of a Smokeless City.*

BY PROF. W. F. M. GOSS, LAFAYETTE IND.

The presence of smoke in those cities of our country which are within easy reach of its soft coal mines is becoming more serious every year. People are beginning to understand that this smoke which, in earlier days was welcomed as evidence of a city's growth, and of its industrial prosperity, is, in fact, a source of heavy expense to all of its citizens. The annual smoke bill of such a city as Indianapolis is, in fact, enormous.

This arises, not from the loss of fuel or heat in the form of smoke, for that is so small as to be almost negligible, but in the damage which is wrought by its presence, upon the architectural embellishment of the city, upon the fixtures and furnishings of its homes, and upon the apparel of its citizens. Loss also occurs through the extensive use of artificial light which the presence of smoke enforces, and because of its effect on the welfare of those from whom it shuts out the sunlight and takes away the purity of the atmosphere.

*A paper before the Indiana Academy of Science.

Thus far urban communities have sought to protect themselves through prohibitive legislation, with the result that while flagrant abuses have sometimes been abated, the atmosphere of the city, as a whole, has not materially improved. It is doubtful if such legislation, unsupported by corrective measures which are broadly co-operative, can ever be made an effective instrument in the abolition of smoke. The problem is one of many complications, and its solution can only be reached through action based upon a full understanding of the difficulties to be overcome.

The sources of smoke in cities may be separated into five different groups, each of which will require different treatment. They are as follows:

1. Large furnace fires, such as are employed in metallurgical processes.
2. Large boiler plants, by which is meant all plants in excess of five hundred horsepower.
3. Small boiler plants and small industrial fires.
4. Domestic fires.
5. Locomotive fires.

Accepting this classification as a convenient one for the purpose in hand, we may inquire as to the process by which the smoke now being delivered by each of the several groups is to be eliminated.

Large Fires Such as are Employed in Metallurgical Processes—Except in a few cities of which Pittsburg is the best type, the proportion of the total smoke delivered from such fires is small. In the city of Indianapolis, for example, it is exceedingly small. Moreover the managements of industries using such fires are, in many cases, finding increased efficiency in operations by the installation of gas producers which receive the coal and deliver highly heated gas for use in the furnaces.

The gas producer makes smokeless the process of converting coal into heat. As its use under a wide range of conditions will result in economy in operation, no injury would be done by the prohibition of smoke from all fires which might properly be served by producer gas, provided a reasonable period is allowed between the passage of the prohibitive ordinance and its going into effect. Fires of this group which cannot be thus treated in such cities as Indianapolis will be so few that their effect will be negligible.

Large Boiler Plants—The suppression of smoke from fires of this class by the adoption of a suitable automatic stoker will effect an economy in operation, hence owners will not seriously object if they are required, after suitable notice, to so equip their plants. An ordinance requiring all boiler plants of more than 500 horsepower to be thus equipped within three years of the date of its passage, would not be unreasonable.

Small Boiler Plants and Small Industrial Fires—Referring first to boiler plants, it should be noted that the fires of this group are ordinarily prolific sources of smoke. Boilers of one hundred horsepower or less are all over the modern city. Generally speaking no economy can result from the application of automatic stokers to these small boiler plants, and hence owners can not be influenced to add to their fixed charges in the expectation of obtaining a money return.

The requirement that such furnaces employ anthracite coal, coke or other smokeless fuel would in all cases work serious hardship, and in many cases it would be prohibitive. The wisest and most effective course to follow with reference to such fires is to provide a satisfactory substitute, then abolish them. So far as such plants are now employed in the production of power, they can be rendered unnecessary through the cheaper and more effective distribution of electrical power. So far as steam from such boilers may at present be used for heating, they can be rendered of no effect through the supply of heat from a central station.

There are, however, in every large city many minor industrial establishments, such as dye-works, bleacheries and laundries, requiring steam at high pressure, and for these a general system of supply from a central plant must be provided. That this may be the more readily accomplished, such industries should be encouraged to group themselves within a prescribed area, to better accommodate themselves to some reasonable plan of steam distribution.

To properly supplant the fires of numerous small boilers now in service it will be required therefore that stations be established throughout the business portion of the city, capable of delivering electric current for power and lights, steam or hot water for heating, and a limited amount of high pressure steam for industrial uses; these central plants to be of sufficient size to justify the use of stokers which will make them smokeless.

When by municipal co-operation these shall have been provided under conditions which will safeguard the interests of all consumers with reference to costs, then it will be in order to prohibit after a series of years, the use of soft coal under all boilers of the city except in connection with automatic stokers.

Small industrial fires other than those under boilers should be sustained by gas drawn from sources hereinafter referred to.

Domestic Fires—While individual domestic fires are not the source of heavy volumes of smoke their number in any city is large and their effect in the aggregate as a source of smoke is as pronounced as that of any other single group of fires. So long as soft coal can be had more cheaply than anthracite coal, just so long will there be a desire on the part of the consumers to employ it in domestic service. Domestic fires being small, it is impracticable to apply to them effectively the principles of smokeless firing. A necessary step therefore in the development of a smokeless city is a complete prohibition of the use of soft coal for domestic purposes. As a preliminary step, two things are essential. First, a supply of low priced gas for use in cooking; and second, the distribution from a central station of large capacity, of steam or hot water for domestic heating.

There are no real problems in the supply of gas for cooking except such as may grow out of existing franchises. At prices now prevailing this form of fuel is much used in cooking and generally is less expensive for that purpose than solid fuels. Add to this the fact that the cost of gas to the producer is reduced as the quantity sold is increased, and an abundant supply at a cost sufficiently low to permit all people in a city to use it for cooking becomes not only possible but attractive as a means of economy.

The establishment of centralized heating plants of sufficient size to justify the maintenance of smokeless fires therein, and in such numbers as to serve an entire city, constitutes a problem presenting no serious engineering difficulties. Such a system would need to be developed under sufficient municipal control to insure satisfactory service to all portions of the city and to guarantee to the consumers of heat a cost not greater than is required to insure a fair return upon the investment made.

Enough has already been accomplished in heating from central stations to insure the practicability of such a scheme. While the loss of heat in transmission is necessarily large, the loss is more than neutralized by the use of low-grade coal in the central station in the place of high-grade fuel now employed in domestic heating, so that, basing an estimate on the heat delivered, the cost should not be greater than under present conditions of domestic heating.

Attention should be called to the fact, however, that such a system would be easily practicable, even at some advance in cost, for freedom from smoke and the convenience of a supply of heat from outside sources, are matters for which people will be willing to pay.

Locomotive Fires—These, in railroad centers, such as Indianapolis, are prolific sources of smoke. However, if soft coal is permitted to be used in fireboxes the delivery of smoke from locomotive stacks can not be prevented. As a consequence, prohibitive legislation in various American cities has thus far had but little effect in reducing the amount of smoke delivered from locomotive fires. It is not the fault of the railway management; it is due to conditions which are inherent in the case. There are, in fact, but two ways out of the difficulty, and the acceptance of either solution will involve railway companies in heavy expenditures and will entitle them to concessions or direct aid from municipalities. The first and simplest is to be found in the requirement of all steam locomotives operating within the smoke limits of a city, to be supplied with smokeless fuel, that is, with anthracite coal or with coke; the second solution is to be found in the prohibition of the use of steam locomotives and in the substitution of electric locomotives within the smoke limits of the city.

The development of either of these plans will involve the establishment of locomotive terminals upon every road outside of the smoke limits of the city. By the use of such terminals the road locomotive of an approaching train can be stopped before reaching the city, its place being taken either by a steam locomotive using coke or anthracite coal for its fuel, or by an electric locomotive which will serve to carry the train on to the city, and afterward out of the station and across the city to another terminal, where it will stop, its place at the head of the train being taken by another road locomotive having its usual supply of soft coal.

Such a plan has been put into effect in New York City and has been settled on for Washington, D. C., where the commissioners of the District of Columbia, November 17, took final action on an order to prohibit the use of any except electric locomotives in drawing trains into the new union station. Excepting in very large cities, however, the cost of electric transmission will be prohibitive. It will be far cheaper for railway companies and quite as satisfactory to the urban communities to admit steam locomotives, pro-

vided they are supplied with a fuel which prevents smoke.

It is evident that procedures under this outline with reference to locomotive fires must necessarily involve plans extending through a series of years. An equitable scheme of co-operation between the railroads and the city must be devised, plans must be made and adopted, and time must be given for financing and executing them.

In the working out of the general plan described by this brief outline for the elimination of smoke many difficulties are to be met and antagonistic interests to be harmonized, but there is nothing which, from an engineering point of view, is impracticable or which can not, as a business matter, be reduced to a satisfactory procedure.

A city to be made smokeless by the measures suggested would first seek to fix limits defining the area to be controlled. Within this area would be developed a series of power and heating plants which would be spaced upon a system of squares in the business portions at intervals of a mile or a mile and a half, and in the residence portion at intervals of two miles. From these several stations would go out currents of electricity for all power and light needed by the city. From certain of them steam at high pressure for industrial purposes would be distributed over the limited areas, and from all of these would go out steam or hot water for heating.

By a suitable grouping of equipment within these stations those in the residence portions would be made to serve as heating plants alone and hence would be out of service during a considerable portion of the year. Because of their size and the perfection of their equipment all would be operated by smokeless fires. All small fires which at the present time serve for heating and power in individual buildings, would cease to exist and large fires under boilers of great industries and in furnaces of metallurgical establishments would be made smokeless by means which would enhance their economy in operation. Railroad trains passing through the controlled area would be drawn by smokeless locomotives and above and around the city a clear atmosphere would contribute to the cleanliness of all things and to the comfort and peace of mind of all its people.

Buy City Parks Now.

Within a quarter of a century small cities of from 10,000 to 25,000 people will be municipalities of from 25,000 to 75,000 population. The quick growth of Western and Southern towns requires no straining of the imagination to foresee this.

Scores of these towns are increasing in population with a rapidity that is scarcely observed, and in a few years parks that seem now a luxury not to be afforded, will be necessities.

Meantime the price of lands is also increasing. In the growing towns a park area of twenty-five acres that would cost now $10,000, at $500 an acre, will cost $5,000 an acre when the cities will be compelled to purchase and lay out parks. The question of adding to the park acreage is one constantly before the large cities of the country.

As a general proposition it seems that any prosperous town of 15,000 inhabitants is wise to invest in real estate for park purposes. Even though the town's revenues do not permit the present conversion of a bare tract of land into well-kept groves and gardens, the enhancement of the value of the land is almost certain to pay in time a handsome return on the investment. Meantime, some work, such as the planting of trees, can be done at little cost.

There is scarcely any investment so safe and profitable as town and city real estate which the citizen can make. If the purchaser can afford to hold long enough the profits are certain. In all cases, the municipality can hold indefinitely; therefore, why should not the municipality invest as trustee for the citizens of the future at the time when it can be done with the best promise of large profits?

The Galveston Plan of City Government.

When Galveston, Tex., was overwhelmed by the great storm in 1900, the city found the former system of government unsuited to the emergency. After one or two trials to secure a form which would be at the same time satisfactory and constitutional, one was found which has since been adopted with some modifications for other cities in the state. Mayor Landis described the system for the League of American Municipalities as follows:

Our form of government is centralized and is in the hands of four honest, capable, competent aldermen, now called commissioners, who conduct the city affairs just as they would their own. Honesty, efficiency and harmony are the secrets of the success of our city government.

The old plan of our municipal government consisted of mayor and twelve aldermen, each of the aldermen being a representative of the twelve wards of our

city, but for five years, beginning in 1890, our city council consisted of a mayor and sixteen aldermen, one for each of the twelve wards and four from the city at large.

Each administration of our city government contained some of our very best citizens, but this class were always in the minority, hence the financial condition of our city kept gradually growing from bad to worse, caused by extravagance, unbusiness-like methods and graft.

Our city's current expenses exceeded her receipts each year, and this deficiency was met by the issue and sale of bonds, to the extent that for the period between 1876 and 1897 bonds to the amount of $2,850,000 has been issued for which the city had received no benefit in the way of public improvements except a few strips of dilapidated wooden block pavements.

This unfortunate condition of affairs continued to exist until our great calamity in 1900, after which the city of Galveston found herself face to face with financial bankruptcy if she could not revolutionize and place herself upon a business basis, and it was under such forced and unfortunate conditions as then prevailed that a committee of our citizens from the very best legal and business element conceived the idea of a city government by commission, and at once went actively at work, framing a new charter based upon a commission plan as the leading feature. Application was made to the legislature, then in session, to annul the old charter, and grant the new one as applied for, completely changing the form of our city government, especially in the election of its officers and the details of its government. This great change was opposed by certain of our citizens as being an innovation on the established rules of many years standing, and this opposition was even carried to our state capitol and the legislature asked to defeat the move, but that body was with the people, as they knew and realized our helpless condition, and the bill passed April 19, 1901.

Our charter called for one commissioner to be known as mayor-president, whose duty it was to overlook the city as a whole, and a commissioner each to be known as commissioner of finance and revenue, waterworks and sewerage, police and fire and streets, public property and electric lights.

With each of these four important branches or arms of the city government efficiently, honestly and economically administered, it was believed the perplexing problem of municipal government was satisfactorily solved.

The next difficulty confronting our citizens was to find five good and reliable men who each in his own way was particularly adapted to each of the positions to be filled, as a man who would make a good commissioner of fire and police would not make a good one for finance and revenue, and so through the whole list.

Our city was very fortunate in finding five men and getting their consent to serve who were each especially fitted for each of the positions named in the charter. The newly appointed and elected commissioners took over the city government, the old charter having expired upon the qualification of the new officers, and the old board, including mayor and aldermen, together with all their appointees and employes, ceased their connection with our city government. The city then passed under the control of the following officers:

William T. Austin—Mayor-President.

I. H. Hempner—Commissioner of revenue and finance.

H. C. Lange—Commissioner of waterworks and sewerage.

A. P. Norman—Commissioner of police, fire and streets.

V. E. Austin—Commissioner of electric lights and public property.

The commissioner of each department being held responsible for results in his particular duty was allowed to name, subject to the approval of the board, all heads of departments and employes. The city government was completed by the appointment and confirmation by the board of the following officers: City secretary, city attorney, city treasurer, city health physician, city auditor, city assessor and collector, city engineer, city recorder, superintendent of waterworks and sewerage, chief of police department, chief of fire department.

In the appointment of the above officers efficiency and honesty were alone considered; political influence, which had heretofore been an important factor in such appointments, had lost its effect.

On taking charge the commission government found an empty treasury, city without credit, employes paid in scrip, which was subject to a large discount for cash, and floating indebtedness running back for several years. The personnel of the commission, together with the heads of departments, inspired confidence and the city was soon put on a cash basis, her credit restored so that it could go into the open market and buy supplies on same terms and prices as our best merchants or wealthiest citizens, and the outstanding scrip was being taken up with our surplus cash as it accumulated in our treasury.

The result of the commission form of government met the expectation of its

most ardent friends and was the pride of every patriotic and civic-loving citizen. Every detail had worked without any friction or hitch until a drayman was arrested and fined $10 by our recorder for violating a sanitary ordinance. The case was appealed to the criminal District Court, upon the ground that our whole city government was unconstitutional, hence the recorder had no authority whatever to impose a fine, and the ground for such action was that a majority of our commission being appointive, the citizen was deprived of the right of ballot guaranteed him by the constitution. The criminal District Court affirmed the verdict of the recorder, but the case was again appealed to the Supreme Court of the State, and to the great astonishment of our people that court by vote of two to one pronounced our form of government unconstitutional, on the grounds that our citizens had no voice in the selection of our officers who were administering the government. Later the Supreme Civil Court held that the appointive feature was constitutional, thus our commission was constitutional in civil matters, but had no police jurisdiction. There was but one thing to be done and that was to apply to the legislature then in session and nearing its close for a change in our charter eliminating the appointive feature, which was the weak point, as decided by the Supreme Criminal Court. We regretted to give up this feature of our charter, because we believed that the very best material for our city government could always be had by the appointive clause it contained.

The emergency required quick action and upon application of our board, joined by our citizens, the seemingly objectionable part of our charter was revoked, the entire elective feature substituted, and in just two days this act was passed by both branches of the state legislature, signed by the Governor on March 30, 1903, and election for five commissioners under the new charter was ordered.

Our city was again fortunate in getting the consent of the original five commissioners to run for their respective offices, and all were elected by handsome majorities, and our city is to-day under the control of the same five commissioners and heads of departments, with the exception of Mayor-president Austin, who died in November, 1905; City Attorney Scott, who died in January, 1904, and City Engineer Sias and Secretary Artz, both of whom resigned soon after their appointment to accept other employment. These vacancies for the unexpired terms were each filled as they occurred, as provided for in our charter, which also provides that the term of the commissioners shall be two years, and election to occur on the Second Tuesday in May every two years.

The meetings of the board are held every Thursday evening at 6 o'clock, and as the utmost harmony prevails business at these meetings is held and dispatched in the same manner as that of a bank or private corporation. The city hall is conspicuous by the absence of politicians and place hunters, as a simple request in writing from the humblest citizen addressed to the board meets with the same consideration as would the presence in person or by attorney of our most influential citizen.

All purchases or contracts amounting to $500 or over are made or awarded on sealed bids after being duly advertised, and this saves our city thousands of dollars annually. Our cash held for the different sinking funds is let out subject to call, on approved security, to our different moneyed institutions at 3 per cent. interest, which is now a source of considerable income.

Our commissioner of finance and revenue at the beginning of each fiscal year estimates the income and receipts of the year, and our board sitting as a whole formulates a budget making disposition of our income, first taking care of fixed expenses, such as interest, and salaries, and each head of department furnishes an estimate of fixed expenses and also contemplated permanent improvements in each particular department, care being taken that expenditures do not exceed receipts, and in no case is this budget deviated from. All unexpended balances at end of year revert back to general fund.

Our city owns its water plant and sewerage system, for which they issued special bonds, and the income not only takes care of the interest and sinking fund of these bonds, but pays a revenue to the city. The city also owns and operates its electric light plant for its own use only, and being run in connection with the waterworks plant, saves a considerable cost in lighting the city.

The commission since its organization has paid off in settlement of old claims and made the following permanent improvements:

Outstanding scrip and interest issued by previous administration	$169,924.32
Outstanding judgments paid and canceled	21,086.49
Permanent improvements, paving, rock, shelling streets, drainage, etc.	279,638.75
Permanent improvement, waterworks, fire department, John Sealy hospital, city hall, etc.	124,040.33
Total	$594,689.89

Besides defraying the fixed expenses of the city government on a cash basis, even to paying its laborers weekly in cash, and without borrowing one dollar, issuing bonds or increasing the rate of taxation, although our taxable values were reduced 25 per cent. by the calamity of 1900, the above sum of $594,689.89 was saved and paid out of the general revenues after the fixed running expenses had been paid. Nor is this all. With the aid and consent of the taxpayers and other friends, our city financed and built our splendid sea wall, paid for it in cash as it progressed, and that was one public contract involving $1,250,000 in which there was not one nickel in rebates, commissions or graft, the people getting an honest return for every dollar paid out.

The details of our grade raising and filling work are under the supervision of a grade raising board, consisting of three of our best citizens, who are appointed by the Governor, and this board has entire control of that work except the financing of same, which is taken care of by our city government, and all payments made upon approval of the grade raising board. The appointment by the Governor removes these officers from all political or other evil influences and insures continuance of the work to completion under the original satisfactory management.

Our public school system is under the supervision and control of a board of trustees elected by the people, and all taxes assessed for educational purposes are collected by the city and turned over to our school board for distribution and maintenance of the schools, and in this particular branch of our government we have been very fortunate, for in its counsels every objectionable feature which might enter into its management has been entirely eliminated and harmony and efficiency prevail throughout the system.

Municipal reform must originate with the people, but such movements are generally delayed until forced upon them by excesses and abuses, and whether caused by carelessness, incompetency or graft, the result to the taxpayers is the same.

Every city can have just as good government as a majority of its citizens make an honest and effective effort to have, and this can only be accomplished by each citizen taking an active interest in seeing that none but good and competent men are elected to office.

LIGHT AND WATER

New Syracuse Lighting Company Refused—Magnetite Lamps for Street Lighting—Bangor Water Works—New York Improvements—Municipal Water Plants and Typhoid Fever—Causes of Typhoid Fever—San Francisco Water Franchise.

New York State Commission Refuse New Syracuse Lighting Company.

The State Commission of Gas and Electricity of New York, by two decisions, refuses to permit the new Onondaga Lighting Company to do business in Syracuse and to lease the existing company's plant in that city. The applications have been pending for several months. They included the issue of stock amounting to $1,000,000 by the new company and an increase of capital stock of the old company, the Syracuse Lighting Corporation, from $4,000,000 to $9,000,000. The disapproval of this lease is based generally upon grounds of public policy. The commission says:

To allow the present return on the present stock issues of $4,000,000 and the present bonded indebtedness of $5,000,000, as well as the same return on any future issued stock, would prevent any future regulation of the price of gas and electricity sold by the Syracuse Lighting Company that did not recognize the outstanding securities as representing the value of the property and the rate of return fixed by the lease as a fair return thereon. Furthermore, from the population supplied by this company must be derived the revenue to meet those obligations. Allowing liberally for an increase in population, for probable decrease in cost of production and distribution, for increased consumption, and for other possible favorable factors, the commission is of the opinion that the contemplated returns upon these securities would impose an excessive burden upon the community, a per capita burden greater than is deemed reasonable or warranted.

Not only is the proposed lease objectionable in these respects, but approval of

it would in the future foreclose the State in the exercise of certain present and important powers of supervision over these interests.

We can see many reasons why consent should not now be given to future assignments of this lease and to the power to amend or alter the same without the approval of the State authorities.

Regardless of the well-meaning and good faith of those who might seek such privileges, it is clear to the commission that no other course is open to it than to deny requests in which are embodied limitations, expressed or implied, of the powers of that State law of which it is the agent in administering.

Magnetite Lamps for Street Lighting.

A supplement to his report on the cost of constructing and maintaining a municipal light plant was submitted to the Board of Works of Newark, N. J., March 14, by Frederick O. Runyon.

By means of numerous tables, Mr. Runyon demonstrates that the average cost per arc light with the "magnetite" lamp in use, and services from a municipal plant for a ten-year period would be $59.67, as against $65.22, the estimate with the present type of lamp, and $70, the rate offered by the Public Service Corporation.

The Board of Works ordered the supplementary report because Thomas N. Carter, president of the Public Service Corporation, offered, about a month ago, to make a new contract, beginning September 1, 1908, at a rate of $70 per lamp a year, declaring that the company was enabled to make that rate because of the marketing of the "magnetite" lamp. The city now pays $95 per arc light a year.

A table comparing the relative cost of lighting the streets and public buildings by contract with the Public Service Corporation and with a municipal plant was included in Mr. Runyon's report. He based his estimate of the cost by contract on a rate of $70 per year for arc lamps, $16 per street incandescent lamp and 5 cents a kilowatt hour. The table showing the annual cost for a period of ten years is as follows:

TABLE OF ECONOMY.

	Contract.	M.O.Plant.	Difference.
1908	$183,200	$173,711	$9,489
1909	191,360	176,904	14,456
1910	199,520	180,097	19,423
1911	207,680	183,290	24,390
1912	215,840	186,483	29,357
1913	224,000	189,676	34,324
1914	232,160	192,869	39,291
1915	240,320	196,062	44,258
1916	248,480	199,255	49,225
1917	256,640	202,448	54,192

Total saving in ten years by means of municipal plant...$318,405

While increasing the item of overhead construction greatly, the report shows that the adoption of the new lamp will have the effect of reducing the capacity of the plant required 47 per cent., decrease the amount of coal necessary to approximately the same extent, and to make the labor required less. Besides increasing the cost of the outside plant, the introduction of the lamps would also have the effect of adding to the money necessary to pay for renewals.

Mr. Runyon estimates the cost of a plant at the old Belleville pumping station at $821,000, as compared with $832,650, the cost as contained in Mr. Runyon's report submitted October 8. In the items that go to make up this total the cost of power station and stack is reduced from $225,000 to $180,000; the estimated cost of boilers, stokers, economizer and steam fitting from $118,000 to $90,000; turbo-generators from $98,000 to $84,000.

With the new lamp, overhead construction charges will cost $167,000 as against $96,000, the original figures. The cost of switchboard and electrical apparatus is increased from $17,000 to $22,000. The cost of a plant at Belleville, exclusive of engineers' fees, is $782,000, as compared with the old estimate of $793,000.

In his first report Mr. Runyon estimated the cost of a plant at the city dock, including engineering service, at $777,000, but in his second report he does not treat of the city dock proposition.

Mr. Runyon says the cost of boilers, economizers and steam fitting is reduced because the magnetite lamp does not require the conversion of so much energy as the ordinary lamp. The cost of the power station and stack is less because they will be smaller than originally contemplated, while the outlay needed for switchboards and other electrical apparatus is lower because of the additional equipment of rectifier panels.

The cost of overhead construction is increased by an amount equivalent to the difference between the cost of "magnetite" lamps and the ordinary lamp. The latter type take 7.5 amperes at 80 volts, as against 4 amperes at 80 volts consumed by the new lamp, which cost about $50 apiece. The present arc lights cost $18 apiece. In his previous report, Mr. Runyon provided for a special type of lamp for Market and Broad streets, 110 in all, and he notes now that they sell for the same price as the "magnetite."

The rate of depreciation in the second report is figured out by the expert to be 5.46 per cent, against 5.07 per cent estimated in October. The increase in the cost of overhead construction, the depreciation of which is fixed at 10 per cent, is mainly responsible for this increase. Interest charges, allowing 4 per cent on thirty-year bonds, and 2 per cent sinking fund, are estimated at $49,000, while the

total tax charges are calculated at $11,440. Maintenance costs, which include labor, coal, oil and repairs, are fixed at $68,180 annually, making the total charges for the first year $173,711.

The report declares that the changes required in the plant of the Public Service by the introduction of the "magnetite" lamp would cost $150,000, including the cost of 2,500 lamps, which, it is estimated, will be necessary to light the city.

Bangor Water Works.

The annual report of the water board of Bangor, Me., for the municipal year ending March 1, says that "continued use of the filter plant and coagulating process has demonstrated that the introduction of this apparatus and process has been of great benefit in clearing and purifying the city water." The report points out that there is yet more to be done, however, according to the recommendations of George W. Fuller, of New York City, who made an exhaustive examination and study of the city's problem of adequate and safe water supply.

Proposed New York City Improvements.

The final report of the New York City Improvement Commission to the mayor and board of aldermen of New York City again propose that the city, when about to undertake an improvement, condemn more land than it actually required, and itself reap some of the increase in value which follows the improvement. The city could in this way, recoup the cost of the benefit. As an illustration of what could be done in this respect, the commission refers to the widening of Livingston street, Brooklyn. A comparison of the prices paid by the city and those paid by private individuals since, the commission says, shows that if this system had been applied the city would have recovered the entire cost of the improvement.

The commission has spent nearly four years on this report, and has attempted to formulate a comprehensive outline for future development. It makes recommendations about parks, streets, the location of city buildings, and the improvements of water fronts, and also presents its views on pavements, sidewalks, house numbers, gas and electric fixtures, street signs, the location of statues and monuments commemorating historical events, tree planting, and cab service.

A system of great highways which should join the boroughs and furnish skeletons for the park and street systems of the different portions is devised. With this idea in view numerous and extended parkways and comparatively small parks rather than large park areas are planned.

The commission recommends the removal of the wall about Central Park, which would permit of the utilization of the ground adjoining the street for paths, seats, flowers and shrubbery. The planting of trees along the avenues fronting on the park so as to make them practically a part of the pleasure grounds, is also suggested.

The commission proposed to unite the systems of Queens and Brooklyn with those of Manhattan and the Bronx, by means of the Blackwells' Island bridge, and has planned an ideal approach for it. A circular plaza 800 feet in diameter, is planned for Brooklyn, at the convergence of the Brooklyn and Manhattan bridges. From this plaza the principal routes of travel would radiate.

The commission employed Olmsted Bros. to investigate and advise as to a general plan for the development of a park system in Queens.

Municipal Water Plants and Typhoid Fever.

Municipal ownership of public water supply plants as a permanent remedy for typhoid fever epidemics was advocated by Dr. Jonathan M. Wainwright, head surgeon of the Moses Taylor Hospital, Scranton, Pa., March 7, at a meeting of the New York Academy of Medicine. He gave a history of the Scranton typhoid epidemic from a medical standpoint, and followed this with a series of conclusions, including the following:

Under the system of municipal ownership, one at least eliminates the harm a private corporation may do during an epidemic in its efforts to safeguard the capital stock at the expense of further disaster to the people.

Physicians and sanitariums must recover from their habit of speaking of a certain amount of typhoid as 'Normal.' Typhoid is a filth disease. The only 'normal' amount of typhoid for a civilized country is none at all.

Causes of Typhoid Fever in Washington.

The recent report of Surgeon General Wyman, of the Public Health and Marine Hospital Service, to the Commissioner of the District of Columbia, based on the findings of his bacteriologists as to the possible causes of typhoid fever in the District, was discussed at considerable length in the Washington Star of March 20, by Dr. G. Lloyd Magruder, who says he thinks more stress should have been laid on the possible contamination and infection of milk and of the water supply at the dairy farms supplying milk for the District.

Dr. Magruder believes that the per-

centage of typhoid fever traceable to milk is much higher than 10 per cent., as given in Dr. Wyman's report. He also believes that a large part of the 67 per cent. of causes of typhoid, classed in the report as "unknown," could be traced directly to the water supply of the various dairy farms in Maryland, Virginia and the District of Columbia. Dr. Magruder says:

If the Commissioners are going to close all the so-called shallow public wells in the city as a means of remedying the situation they should thoroughly investigate the wells and other sources of water supply at the farms outside of the District with a view of condemning the contaminated ones or the offering of suggestions to better them. At any rate they should direct the dairy farmers to be more careful. I am of the opinion that good results would be attained thereby.

A large proportion of the 67 per cent. of cases of typhoid fever unaccounted for in Dr. Wyman's report, is probably due to the fact that the water supply of many of the dairy farms is badly contaminated. I base my opinion upon an examination of the water supply of dairy farms in 1895 by Dr. J. J. Kinyoun, formerly connected with the marine hospital service, and the field examination of sixty dairy farms last November and December by Karl F. Kellerman of the bureau of animal industry of the Department of Agriculture. It was shown by both of those investigations that nearly 75 per cent. of the water supplies were infected and contaminated.

I consider the per cent. of cases attributed to milk in Dr. Wyman's report too low. The per cent. of cases mentioned in the report as imported into the District coincides with the observations I have made since 1895. That more cases of typhoid are due to milk infection is not only attributable to the lack of precaution in handling that commodity on its way from the farm to the city and at the local milk depots, but from the source of supply. I would recommend that the dairy farmers be encouraged to first boil all water used in connection with milk utensils and to endeavor to have the farmers periodically clean the wells and springs. In certain states the health officers have issued circulars to farmers, and I am informed that good results have been noted. It is a well known fact that typhoid fever is highly prevalent among the country population.

Regarding the investigation of the Potomac river water supply, which Dr. Wyman states he is still carrying on, Dr. Magruder says there is no reason to look to the Potomac as the possible cause for the greater part of the typhoid fever cases. He says:

The prolonged series of experiments that were conducted during September, October, November and December by the Department of Agriculture and the officials of the new filtration plant to eliminate further suspicion of the Potomac water, showed that the filtered water in Washington is practically free from contamination. It is very gratifying to note that the commission of the marine hospital service, in Dr. Wyman's report, indorsed the recommendations made in 1894 by the Medical Society of Washington and continuously urged since that date. That the public wells were unhealthy and contaminated from sewage, as referred to in the Wyman report, is nothing new. A committee of the Medical Society, of which I was chairman, found that out thirteen years ago, and recommended to the then Commissioners of the District that they be abandoned. More than 75 per cent. of them have, I am glad to say, been closed.

The report has shown most graphically the absolute necessity for a change in the conditions in handling the local milk supply from the dairy farm to the consumer. The bacteriological counts are most astounding. It shows the necessity of cooling the milk at the farms; keeping it cool in transit and in the process of delivery to families. That opens up the question of the legislation requested by the Commissioners of the last Congress, to require a temperature standard at which milk should be delivered. It is eminently desirable that milk should be kept at a temperature of about fifty degrees. To avoid unnecessary hardship on the farmers, ample time should be given to prepare for the proper harvesting of ice. Only one winter in fifty years, according to the statistics of the weather bureau, has it been so warm in the vicinity of Washington that it was impossible to harvest ice. There is no excuse for a farmer not securing enough to answer his demands.

If the delivery of milk to the dealer in the city could be arranged so that he could get his morning supply in time to bottle it before noon, the public would have milk twenty-four hours fresher for lunch and dinner or dinner and supper, as the case might be, and it would be possible for the consumers to keep in their own ice boxes the small supply left over for breakfast instead of having the milk kept twenty-four hours in the ice box of the dealer before he starts to deliver it.

Dr. Magruder strongly urges this recommendation in Dr. Wyman's report. He says:

From the fact that out of 747 cases of typhoid fever that were contracted in the District of Columbia, 643, or 80 per cent., used raw milk, there is strong reason to suppose that milk was an important factor in the production of the disease, especially in view of the reports of the contamination of the water supply used by dairy farmers and the positive knowledge that there were a number of typhoid fever cases on the farms in Maryland, Virginia and the District during the past summer and autumn.

Dr. Magruder regards as exceptionally important and interesting the report of Mr. Kellerman, of the Bureau of Animal Industry, to Secretary Wilson, of the Department of Agriculture, of a field investigation he made last November and December of the water at sixty dairy farms. A synopsis of this report follows:

Only that part of the work which bears directly upon the bacteriological conditions of the water supplies of the dairy farms will be dealt with here, and, although it is impossible to determine accurately the condition of the milk which

is sent out from a dairy farm by the relative pollution of the water supply of that same farm, it may fairly be classed as an inferential method of diagnosing the probable danger of similar pollution occurring in the milk. It is possible, of course, that by using only hot water for rinsing cans and bottles, or even by thorough pasteurization, milk of an exceedingly high purity could be distributed from a farm, the water supply of which was badly contaminated, but as Prof. Sedgwick says, in his principles of sanitary science, "The fact appears to be that the dairy industry is, as a rule, in a very primitive state." Therefore, it is doubtful if the above precautions, or, in fact, any of the essential precautions will be taken to preserve the milk from pollution.

In the course of this brief survey about sixty dairy farms have been visited and the number of bacteria in the water supply determined, and also the presence or absence of the colon bacillus. To make the tests as strictly representative as possible, the work of plating water samples and inoculating fermentation tubes was carried on entirely in the field, the water being sampled and plated immediately upon being taken from the well or spring. The presence of bacillus coli is not indicated unless occurring at least in one cubic centimeter.

Of the sixty wells examined, twenty-two contained below 500 bacteria to the cubic centimeter, and of this number but six showed the presence of bacillus coli in samples of one c. c.; nine showed the presence of between 500 and 1,000 bacteria to the c. c., and of those three showed the presence of bacillus coli; nineteen showed the presence of 1,000 to 5,000 bacteria to the c. c., and of these ten showed the presence of bacillus coli; sixty showed the presence of 10,000 to 50,000 bacteria to the cubic centimeter, and of these five showed the presence of bacillus coli.

Although there is great diversity of opinion as to what bacteriological limits are proper for well water, we may fairly assume that the wells containing less than 500 bacteria to the cubic centimeter and not showing the presence of bacillus coli are good water supplies. Where local conditions appear to give a high bacterial count of harmless bacteria, water supplies containing less than 5,000 bacteria to the cubic centimeter, and not showing the presence of bacillus coli, may be counted as safe water. The presence of over 5,000 and less than 10,000 bacteria to the cubic centimeter when the colon bacillus is not present may be considered suspicious, and water containing more than this number of bacteria to the cubic centimeter should be considered unfit for use. The presence of the colon bacillus must be studied in connection with the total count, and to some extent in connection with the local conditions, in order to determine the relative importance of its presence; or, in other words, its relative importance as indicating sewage pollution. Under these divisions we would be forced to class the various well waters indicated in the charts as follows: 16 good, 15 fair, 17 suspicious and 12 unfit for use. Using this survey of a few dairies in various regions in the neighborhood of Washington as the criterion for judging the condition of all of the dairy farms, it would seem highly probable that under the conditions portrayed much of the typhoid of the city of Washington may be ascribed either directly or indirectly to the unsanitary dairy farms.

San Francisco Water Company's Franchise Forfeited.

The Board of Supervisors of San Francisco, Cal., by unanimous vote has declared forfeited to the city and county of San Francisco all franchises in the city and county, together with all waterworks and other plants of the Spring Valley Water Company, which has a monopoly on the water service of the city. The company estimates the value of the franchise and works at $53,000,000.

This action was taken in pursuance of a section of the state constitution which provides that any water company which collects rates in excess of those allowed by the ordinance of any board of supervisors or city council, which are given the right to fix all rates, shall lose its charter, and that all its property shall be forfeited and revert to the city or county.

CONCRETE

Concrete Block Construction—Foreign Block Trade—Cement Sewer Pipe.

Suggested Regulations for Concrete Block Construction.

Legislation regulating the manufacture of cement blocks is recommended by Nels Erickson, of Minneapolis, Minn. He proposes to license cement block makers, charging a fee of $25, to fix the proportions by law, recommending five parts of clean sand to one part of cement; where sand and gravel are mixed they should be two parts gravel, three parts sand and one of cement; would have them dry-mixed in a mixing machine, then sprinkled with clean water and mixed to a stiff mortar; no batch should be allowed to

stand longer than thirty minutes; blocks should be watered freely until they will shed water. Mr. Erickson would also make limitations upon the use of blocks, requiring foundation blocks 12 inches thick for a story and a half building and 16 inches for two stories. The length of a wall should not exceed 45 feet without cross walls in two-story buildings, and in higher buildings the blocks should vary accordingly. The air space should not be less than 25 nor more than 30 per cent.

Eighteen Tons of Cement Block Machines Go to Egypt.

An order shipped March 3, 1907, to Egypt, of Hercules concrete block machines, weighed a little over eighteen tons. The same week three machines were shipped to Ireland and two to Porto Rico. The Century Cement Machine Company, of Rochester, N. Y., makers of the Hercules, report a large increase in domestic as well as foreign orders.

Cement Sewer Pipe.

In a recent circular issued by the Association of American Portland Cement Manufacturers is an article on cement sewer pipe by Rudolph Hering, consulting engineer, New York City, which discusses the advantages and disadvantages of cement in sewer pipe. He says that the manufacture of cement sewer pipe has been extensively practiced in different parts of Europe for many years. The cement used for the purpose was Portland cement, the strongest and most reliable of the common cements for building purposes.

It is only ten to fifteen years ago that Portland cement was first manufactured in the United States to any great extent. Prior thereto we used imported Portland cement, the expense of which greatly limited its use, and also the so-called American natural cement, which, though much cheaper, was also much inferior in strength and durability.

In the last decade we have been able to buy good American-made Portland cement at a reasonable price, and its use has therefore grown to large proportions. Whole bridges, retaining walls and houses are now built of concrete, plain or reinforced, and this method of building is rapidly increasing because equally strong structures can be built with it at a less cost than formerly.

Cement or concrete sewer pipe has partaken of the same development. Following the European practice, we have been able through the use of Portland cement to make equally good pipe, because we now have available the same material and similar machinery for manufacturing.

Cement sewer pipe has a competitor in the United States, perhaps to a greater extent than elsewhere, in vitrified clay pipe, which is very extensively made in our country, and is still almost exclusively used for small sewers. It is made in many States, can be molded, dried, salt-glazed and burnt wherever suitable clay is found. Cement or concrete pipe can be made of broken stone, sand and cement wherever such materials can be brought together, which offers a much larger territory for its manufacture than clay pipe. As cement pipe can generally be made cheaper than clay pipe, it is naturally forcing itself into use.

In the following, reference is made to cement pipes 12 inches in diameter and larger until the pipes become so large that it is cheaper to form concrete in place in a trench than to make the pipes outside and transport them to the trench.

The following advantages of cement or concrete over vitrified clay pipes can be enumerated when both are well made of the best and most suitable materials:

I. A sectional form can be given them which is more conducive to stability and efficiency than round clay pipes.

(*a*) While for purposes of even burning a nearly uniform thickness is desired for clay pipe, no such requirement is necessary for molded concrete pipe, which, when setting, retains its shape and grain. It is therefore possible to give concrete pipes better sectional forms, as referred to under (*b*) and (*c*).

(*b*) It is practicable and customary in Europe and in America to give concrete sewers a flat, broad and level base. Such a base has the advantage of allowing the pipe to rest firmly and securely upon a continuous flat earth foundation, as compared with the circular bed required for circular pipes, with the necessity of cutting out a depression in which the bells can rest. The difficulties of securing a perfect bearing for the barrel of circular pipes by tamping the earth back-filling into the space beneath the two sides of the pipe are not slight, and often have been the cause of a breakage of the pipe on account of an insufficiently strong bearing, due to hollows left by insufficient compression of the material. In fact, to get in this respect the same advantages as flat bottom cement pipe it is customary in some places to put a layer of concrete into the trench, upon which subsequently the vitrified pipe is laid, the concrete being then brought up to the spring of the pipe.

(*c*) The oval or "egg" shape for such sewers as have a variable flow has great

advantages over a circular section, which is well known. It has not been found practicable to give the vitrified pipes a true oval section on account of the warping due to burning, and therefore only a circular shape is now generally in use. While this shape is sufficiently good for small pipe sewers less than 12 inches in diameter, it is often not as good as the egg shape for sewers over 12 inches in diameter. Cement and concrete sewers can as readily be made egg shaped as circular.

II. As vitrified pipe warps in burning, the section is not finished truly circular, and slight projections are formed at every joint when the pipes are laid to form a sewer. These projections are more or less objectionable in a sewer, because suspended matter catches and is retained thereby. Cement and concrete pipes, whether circular or egg shaped, do not warp, and therefore can give a sewer an even surface upon which the sewage can flow.

III. As cement pipes have a truer sectional shape than vitrified pipes, they can be given a slanting butt joint, as is customary in Europe, instead of the more costly bell and spigot joint common for vitrified pipe, which are made in imitation of cast-iron pipe used under high pressures. Vitrified and cement pipes are never used under high pressures, and the hub and spigot joint, as now used, seems to be of advantage only to obviate the difficulties of joining two pipes which are not exactly true in section. The slanting butt joint is therefore quite rational for concrete pipes, while this is not so for vitrified pipes. It is less expensive to make, both in manufacturing the pipe and in joining the pipes with mortar in the trench.

IV. Concrete pipes are tougher—that is, less brittle than vitrified pipes. Therefore, they are not as easily broken by rough handling and by having heavy matters drop upon them.

V. Concrete pipes, if well made of proper materials, have a strength to resist compressive, tensile and bursting strains which is amply sufficient for all purposes of a sewer in a large city.

The following disadvantages of cement over clay pipe are enumerated, supposing that both pipes are equally well made of respectively the best materials.

I. Portland cement used for the manufacture of concrete pipes is attacked by certain strong acids, such as sulphuric acid, which converts the carbonate into sulphate of lime, otherwise called gypsum, which is comparatively soft and easily eroded. Therefore, cement pipe is not generally used where strong acids are known to enter the sewers.

Vitrified pipe will stand the effects of most acids. When the joints are made of cement they will, of course, be acted upon by acids as readily as the cement pipes.

It should be added that the acid question must be viewed in a reasonable light. When the dilution by sewage is sufficient the discharge of a small amount of even strong acid will not cause objectionable effects, as evidenced by European cities by the use of concrete sewers almost exclusively in some cities, as Paris and Vienna. In England concrete sewers are also very common.

It should be said that strong acids attack not only cement, but bricks. But bricks are extensively used both in America and in Europe for large sewers. In fact, almost all large sewers are built either of brick or of concrete.

The greasy substance which is usually found to coat the perimeter of a sewer under the water line tends to protect the cement from the action of acids.

II. Vitrified pipe resists greater bursting pressure than cement pipe. This quality is of value should a vitrified pipe be called upon to withstand a high pressure of water. Such resistance requires an equal resistance in the joints, which are usually made of cement.

For sewer purposes this high resistance of vitrified pipe to bursting pressure is not valuable. If a sewer can safely withstand the shocks of rapidly flowing water and the bursting pressure due to a complete filling of the sewer and running under a head equal to that existing when manholes are full and the sewage is running out on the street surface, we have secured the same against a failure from bursting.

III. Due to the glazing of vitrified pipes, we get an advantage for them over cement pipes, which usually are not manufactured with an equally smooth surface. The advantage lies in the slightly better flow given to the sewage, which is due to less resistance. But this advantage is canceled in practice, sometimes wholly, by the additional resistance given to the flow of water by the projections at the joints of each pipe, due to their imperfect shape.

IV. The structure of the material of vitrified pipe sewers generally does not change. Whatever it is when the pipe is examined at the point of delivery, it will usually so remain. The structure of the material of cement pipe may undergo chemical and physical changes and decompose after years of use, as seen by the cemented iron water pipes much used in New England, and for which natural cement was used.

If the materials are properly selected and none but Portland cement is used,

and clean sand and stone properly mixed, and if the workmanship is equally good in both cases, then this difference no longer exists. We can see burnt clay pipes and bricks in Rome several thousand years old, and we can also see at the same place cement mortar of equal age and strength. We have concrete work in the sewers at Paris several hundred years old, and also concrete in more modern structures which we have no reason to believe will deteriorate.

It will be essential when using concrete to have sufficient and competent supervision of its manufacture, in order to assure the use of good materials and workmanship. Then there should be no doubt concerning its permanent efficiency, and when used for sewer pipes an equal permanence to that of vitrified pipe should be secured.

V. The material of vitrified pipe is generally more dense than that of cement pipe, and water under pressure will not as readily percolate through the body.

This quality is important when pipes run under pressure, which sewers, as a rule, do not. Even if sewage should enter the body by capillarity, it would not go through the pipe as sewage. In either case it would somewhat resemble a Pasteur filter and purify the sewage. Leaks through imperfect joints, as a rule, would operate, with either vitrified clay or cement pipe, before a leakage would occur through the body of the pipe.

In discussing this paper Mr. Robert W. Lesley comes to the defense of cement sewer pipe as to resistance to action of acids, saying that certainly sewage contains no more acid than the water used in the manufacture of paper. There sulphuric acid is used in sufficient quantities to digest wood to paper pulp. Various illustrations are given upon this subject, namely, the Willcox Paper Mills, at Glen Mills; the use of concrete for lining the digesters in paper mills at Holyoke, Mass. —in fact, all through the United States— and the use of concrete for the floors in the paper mills at Long Island City. Certainly in no case of sewage is there a deliberate intent to get the acids which would attack cement in such concentrated form as they are found in the manufacture of paper, where the acids, hydrochloric and sulphuric, are actually used to destroy the wood pulp in the preparation of the finished product.

In his work on "Beton and Reinforced Concrete," Mr. Tedesco, speaking of the influence of various substances upon cement, states that it is particularly susceptible, in its powdered state, to acids; that it is a well-known fact that carbonic acid will destroy powdered cement and a large amount of sulphuric acid will have similar results, but he goes on to say that when the cement is hardened it is little sensible to acids or other chemical agencies.

When a mortar is well compacted and the pores are closed, it becomes largely free from any attack of this kind. Mr. Tedesco goes on to say that a hardened cement does not resist energetic acids, which, acting on the lime, may form soluble chlorides, acetates, etc., but such acids as sulphuric acid, sulphurous acid and sulphuretted acid are little to be feared, because they form insoluble or difficult salts, or salts that are soluble with great difficulty. In such cases they form a sort of coating which protects the cement against the exterior influence of these acids.

ROADS AND STREETS

Paving in Superior—Increasing Width of Pavement—Illinois Bridge Trust Cases—New Jersey Roads—Asphalt Work in St. John— Wisconsin Roads—Asphalt in U. S.

Paving in Superior, Wis.

The report of City Engineer Banks, of Superior, Wis., for the year ending January 31, 1907, was filed recently with the Board of Public Works. Mr. Banks makes several recommendations regarding paving and sidewalk material for future use. He recommends that no more plank sidewalks be built in the city because lumber has become so high priced that there is very little difference in cost of it and cement, and he advocates cement on account of its desirability. Mr. Banks states that 27,767.78 square yards of paving were laid, at a cost of $51,878.31. Of

this amount, 26,667.78 square yards were plain macadam street paving and the remainder brick alley paving. He recommends plain macadam for the residence streets in the future, and states that when it wears down to a certain surface, it is then in good shape for a coating of tar macadam, which will make a good paving at a low cost. He is of the opinion that a mixing plant would be a good thing for the city to own.

Increasing Pavement Width Invalidated Assessment.

The Michigan Supreme Court rendered a decision, March 5, holding that the protest of John L. Stoddard aaginst the assessment for laying an asphalt pavement in Center avenue, Bay City, Mich., in 1902, was just. The Supreme Court held that there was a jurisdictional defect in the proceedings consequent upon the decision to increase the width of the pavement. The plaintiff appealed to the Supreme Court from a decree entered by the Bay County Circuit Court on the petition of the auditor general for sale of the lands delinquent for taxes.

Bridge Trust Cases in Illinois.

The Grand Jury at Freeport, Ill., brought indictments with over 100 counts, March 20, against bridge men and highway commissioners, charging all with implication in conspiracies and one with bribery. Several bridge firms are indicted.

Asphalt Work in St. John, N. B.

The following statistics regarding asphalt work in St. John, N. B., are supplied by R. H. Cushing, director of public works. The season for work is from May 1 to November 20. For the years 1902 to 1906, inclusive, there have been laid for sidewalks and crossings in asphalt from 36,000 to 43,000 square yards per season, the total being 203,600 square yards in the five years, of which one-twentieth was new work and nineteen-twentieths repairs. All the work of mixing, spreading, rolling, etc., was done by hand. A crew consists of one foreman, one pot man, three laborers and one horse and sloven, costing in all $10.40 per day, and they average 128 square yards of completed work each day of nine hours. Weather conditions admit of working ninety per cent of full time. Boiling pot, sand heaters, mixing platform, etc., are moved from place to place, so haul from place of mixing to place of laying does not exceed one-half mile, and the time of moving and setting up said plant is included in cost; a crew puts out five mixes per day, averaging about 25 square yards per mix.

The 203,600 square yards cost for labor $16,028; material and tools, $28,682; total, $44,710, being practically for labor 8 cents, for material and tools 14 cents, or total 22 cents per square yard. Lumber, tools, maintenance and renewals of plant are included in above and amount to about $90 per year. No allowance is made for interest on cost of plant, for the cost is very small. No allowance is made for depreciation of plant, because cost of maintenance and renewals is included in above, and plant is in better condition now than in 1902. No allowance is made for superintendence or office staff, because such work is performed by the regular city officials without extra cost.

In laying the 203,000 square yards there were used:

Dry, hard wood (cord 4x8x5), 305 cords at $6	$1,830.00
Tar, 42 gallons per barrel, 3,580 barrels at $2.55	9,129.00
Refined Trinidad Lake asphalt, 2,224 barrels at $4.65	10,341.60
Sand, 10 barrels per 2-horse load, 5,610 loads at $1.25	7,012.50
Total	$28,313.10

Gravel hauled from beach and included in labor.

All prices are for delivery at the mixing place.

The material required for 1,000 square yards of such asphalt work includes: Dry hard wood, 1.50 cords; tar, 42 gallons per barrel, 17.60 barrels; Trinidad Lake asphalt (refined), 10.92 barrels; sand, 10 barrels per load, 27.56 loads.

New Jersey Roads.

The Office of Public Roads, of the Department of Agriculture, has issued a report showing the condition and improvement of roads in New Jersey as follows:

The accompanying table shows that in 1904 there were 14,842 miles of public road in the State of New Jersey. Of this mileage, 481 miles were surfaced with gravel, 1,901 miles with stone, and 40 miles with shells, making in all 2,422 miles of improved road. It will be seen from these figures that 16 per cent of the roads have been improved. By comparing the total road mileage with the area of the State, it appears that there were 1.97 miles of road per square mile of area. A comparison of mileage with population shows that there was 1 mile of road to every 127 inhabitants, and 1 mile of improved road to every 777 inhabitants.

This State appropriates about $250,000 annually to aid the counties and townships in the permanent improvement of roads constructed under the direction and according to the specifications and plans of the State highway commissioner. The State pays 33 1-3 per cent of the cost of these roads, the counties in which the roads are built 56 2-3 per cent, and the townships 10 per cent, so that for every

$250,000 appropriated by the State for permanent roads the counties and townships appropriate and expend on the same roads $500,000. The share borne by the counties for State-aid roads may be paid from funds secured by assessment on the taxable property in the county, by temporary loans, or by the issue of bonds. The temporary loans are paid out of the next annual levy, and the interest and principal on bonds are paid annually from assessments on property made for the purpose.

Boards of chosen freeholders of counties are authorized to construct and repair certain county roads. The cost of building these roads may be paid out of a special tax levied by the Board of Freeholders for the purpose, or by temporary loans, or by the issue of bonds. The cost of repairs, as well as the interest and principal on temporary loans or bonds, is paid for out of a special tax levied for this purpose.

The qualified voters of the township at their town meetings appropriate or raise the necessary funds for opening and repairing roads. The funds to meet these appropriations are assessed against the taxable property in the township. In case the qualified voters fail to provide funds for this purpose, special elections may be held, where the necessary money is raised by the vote of two-thirds of the voters present. No township is authorized to assess for road purposes more than 70 nor less than 20 per cent of the amount raised for county and poor tax.

The legal voters of the boroughs are authorized by law to assess and appropriate annually such sums as may be necessary for the construction and repair of roads. In case the voters fail to appropriate for this purpose the mayor and council of the borough may fix the road tax at a sum not to exceed three-fifths of 1 per cent of the assessed valuation of the property in the borough.

Expenditures for the construction and repair of bridges are paid by the counties in cases where the bridges cross running streams.

The total amount expended by counties, townships and boroughs for road and bridge purposes was $3,024,811.25 in 1904. This includes $891,831.48 for construction, repair and maintenance of bridges, and also the amounts expended by counties and townships on State-aid roads. The amounts expended by the State on State-aid roads in the various counties was $250,000, making a total expenditure of $3,274,811.25. By comparing the total amount expended with the total mileage of public roads and with the population of the State, it is found that the funds collected and expended for road purposes amounted to $220.64 per mile of public road, or $1.73 per inhabitant.

The Use of Asphalt in the United States.

From the recent volume on the Mineral Resources of the United States, issued by the United States Geological Survey, some interesting comparisons regarding the use of asphalt can be drawn. Since 1902 or 1903 there has been a material reduction in the production of all kinds of asphaltic materials except gilsonite and oil asphaltum, fully 25 per cent less being produced in 1905 than in 1902. The increase in the production of oil asphaltum has been 30,000 short tons since 1902, and the 10,916 tons production of gilsonite in 1905 is practically all increase. There has been a slight increase in bituminous limestone and in mastic, which is much more than offset by the considerable reductions in production of bituminous sandstone and hard and refined, or gum as-

County.	Miles of Public Roads — Total road mileage.	Surfaced with* — gravel.	stone.	shells.	Expenditures — ** By counties, townships and boroughs.	By State on State-aid roads.	Total.
Atlantic	688	82.24	15.27	....	$88,554.58	$10,963.58	$99,518.16
Bergen	753	.....	13.04	....	249,763.33	17,755.03	267,518.36
Burlington	1,334	39.66	149.22	.....	195,642.13	5,971.03	201,613.16
Camden	515	21.14	93.54	.....	86,807.95	9,817.67	96,625.62
Cape May	380	54.46	.....	.....	24,696.38	8,473.35	33,169.73
Cumberland	691	25.22	.....	16.00	51,768.99	7,616.69	59,385.68
Essex	691	.....	391.54	.....	296,786.82	21,936.63	318,723.45
Gloucester	629	37.82	37.07	.....	104,782.95	.....	104,782.95
Hudson	363	.....	109.76	.....	77,413.34	.....	77,413.34
Hunterdon	777	.....	.....	.....	62,329.78	.....	62,329.78
Mercer	453	.....	139.54	.....	226,910.24	21,002.16	247,912.40
Middlesex	788	62.48	139.07	.....	193,786.46	27,640.77	221,427.23
Monmouth	1,058	72.66	64.92	.....	357,636.92	14,001.07	371,637.99
Morris	976	.....	148.14	.....	224,815.37	18,821.62	243,636.99
Ocean	821	79.77	10.00	.....	127,122.15	12,079.60	139,201.75
Passaic	500	.....	221.13	.....	258,883.26	3,711.20	262,594.46
Salem	697	5.92	7.79	23.78	34,584.83	17,227.29	51,812.12
Somerset	612	.....	118.88	.....	104,177.86	20,080.92	124,258.78
Sussex	805	.....	17.60	.....	82,600.66	4,105.06	86,705.72
Union	567	.....	161.21	.....	86,283.82	1,106.99	87,390.81
Warren	738	.....	53.33	.....	89,463.43	27,689.34	117,152.77
Totals	14,842	481.47	1,901.05	39.78	$3,024,811.25	$250,000.00	$3,274,811.25

* Where figures are not given in these columns, no mileage has been improved.
**This column includes expenditures for highway bridges and amounts spent by counties and townships on State-aid roads; also road expenditures in boroughs.

phalts. At the same time that the quantities of asphalt have diminished the prices have been reduced. Thus the hard and refined or gum asphalts averaged $21.31 per ton in 1904 and $13.65 in 1905. Oil asphaltum diminished in value from $10.34 per short ton in 1904 to $8.59 in 1905. This reduction is due in part to the larger quantities of the cheaper "road asphalts." The competition of these oils in California also reduced the value of the bituminous sandstones from $2.97 in 1904 to $2.42 in 1905.

Importations show similar reduction in use of asphalt, the importation in 1903 being 193,640 tons and only 157,450 tons in 1905. The reduction in importation of Trinidad asphalt was over 46,000 tons. There were also reductions in imports from Italy, Germany, Mexico, United Kingdom and Turkey in Europe, and increases from Cuba, Venezuela, Switzerland, Turkey in Asia, Colombia, Austria, and France, mainly from the first three. The value of the asphalt imported in 1905 was greater than in 1904, notwithstanding the smaller amount, doubtless because the increases and importation were in asphalts high in bitumen and the decreases in those low in bitumen. The quantity of pitch lake asphalt imported from Trinidad (53,701 tons) is the smallest it has been for fifteen years, and of land asphalt (13,581 tons) the smallest for nine years.

There is the same reduction in production of asphalt in all the asphalt-producing countries except Italy, which shows a material increase, nearly 60 per cent since 1902.

Wisconsin State Road Investigation.

The Wisconsin State Geological Survey is systematically studying the condition of the roads of that State, together with the methods used in building them and keeping them in repair. It is taking up this investigation for the purpose of spreading as widely as possible the knowledge of how to build roads properly and how to care for them in the most economical and intelligent manner. It is the purpose of the Geological Survey to put itself in a position to furnish information as to the ways of getting the best results out of the money the people are already putting into their roads, and in this way enable them to secure better roads without adding greatly to their present expenditures.

The Septic Tank Suit.

The Cameron Septic Tank Co., of Chicago, brought suit against a number of cities for infringement of its patents by part or all of their sewage disposal plants. Several of these cities, Saratoga Springs, N. Y., Madison, Wis., Lake Forest, Ill., Monmouth, Ill., and the Allis-Chalmers Co. for West Allis, Wis., joined in the defense of the suit against Saratoga Springs as a typical case. The suit was decided March 12 in favor of the defendant.

ORGANIZATIONS AND INDIVIDUALS

Municipal Engineers of New York—Civil Service—Technical Meetings—Personal Notes.

The Municipal Engineers of the City of New York.

The Municipal Engineers of the City of New York is an organization with a membership of 440, composed of members of the engineering staff of the city of New York. The society was organized over four years ago for the purpose of bringing the engineers of the various departments of New York City in closer touch with one another, and thus aid in preventing conflicts in the work of the departments because of misunderstandings. The Municipal Engineers has met with great success, and apparently fills a new field in a very satisfactory manner. The officers for the year 1907 are as follows: George S. Rice, president; Robert Ridgway, first vice president; Robert R. Crowell, second vice president; Clarence D. Pollock, secretary; Arthur S. Tuttle, treasurer; Henry R. Asserson, Edward A. Byrne, Benjamin S. Wever, Llewellyn W.

Freeman, Edward H. Holden, Martin Gay, William R. Hillyer, Herman K. Endemann, Edward L. Hartmann, George R. Olney, William D. Lintz, Alberto Schreiner, Daniel D. Jackson, Frederick C. Noble, Cornelius V. V. Powers, directors. The society publishes an annual volume of proceedings.

Civil Service Examinations.

The U. S. Civil Service Commission will hold examinations at the usual places as follows:

April 24, 25: Assistant geologist and geologic aid in the Geological Survey at $1,000 to $1,600 a year.

April 24: Geologist in the Philippine Service at $1,800 a year.

April 24: Apprentice draftsman in Ordnance Bureau, War Department, at $30 a month with promotions up to $60 and privilege of entering examinations for $100 places when training and experience become sufficient.

April 10: Engineman in Quartermaster's Department at Large, Fort H. G. Wright, N. Y., at $900 a year.

Technical Meetings.

The building given by Andrew Carnegie for the use of American engineering societies will be dedicated on April 16 and 17, 1907, under the direction of the trustees of the United Engineering Society, representing the American Society of Mechanical Engineers, the American Institute of Mining Engineers and the American Institute of Electrical Engineers. The building is located at 29 W. 39th St. The program includes the formal dedication exercises on the afternoon of the 16th, a reception in the evening and on the afternoon of the 17th addresses by the representatives of the founder societies, greetings from sister societies, and presentation of medals. These exercises will be followed by meetings of the American Institute of Mining Engineers on the afternoon of April 18 and 19, at the first of which Mr. H. T. Hildage will describe the excavation and tunnel work now being carried on by the Pennsylvania Railroad. There will also be a meeting of the American Society of Mechanical Engineers on the evening of the 18th, at which Brig.-Gen. William Crozier will deliver an address on "The Ordnance Department as an Engineering Organization." On the evening of the 19th an informal smoker for members of all societies will be held.

At a meeting of the Municipal Engineers of the City of New York, February 27, De Forest H. Dixon, secretary of the Turner Construction Co., read a paper on "Construction Details of Reinforced Concrete Work." He said that the many recent failures in reinforced concrete were, in most cases, due to skimped design plus poor material and workmanship. In order to arrive at the best work the five requisites are (1) good plans, (2) good organization of force, (3) good material, (4) steel in proper position, (5) good concrete.

At a meeting of the Western Society of Engineers at Chicago, March 6, Dr. W. Michaelis delivered an address on "How to Prevent Failure in Concrete Construction," in which he criticized the present building ordinances and suggested changes which he held would improve buildings in Chicago. He said: "In my opinion, failures can be materially lessened, if not entirely prevented, by proper building ordinances which make it compulsory to use concrete of specified proportions of crushed stone and cement, to use the proper kind of reinforcement in each case and the necessary amount of it. Certain standard rules should be laid down by a board of building examiners and certain types of reinforcing material should be excluded where they are not in their proper place. In addition to these points, which refer to the designing of the structure, the erection of the building should be accompanied by continuous tests of the strength of the construction. If a few of our larger cities will make a start and adopt such building ordinances as I have suggested, smaller towns will soon follow their example."

The fourth annual convention of the American Roadmakers' Association was held in Pittsburg, Pa., March 12, 13, 14 and 15. More than 2,500 delegates, representing thirty-eight States, were in attendance. Among the addresses delivered was one by Logan Waller Page, director of public roads of the Department of Agriculture, Washington, on "Work of the Office of Public Roads," in which he said: "The present movement for the betterment of our roads had its beginning only about fifteen years ago. The States had made no effort toward directing the work or aiding it by appropriations of money. The federal government had not yet taken up the investigation and educational work which it is now conducting. We had everything with which to achieve such a wonderful progress in road building as to furnish one more example of the world-surpassing qualities of the American citizen. This could not be done without effective organization and administration. New Jersey has the distinguished honor of being the first of what are known as the "State-aid States." Twenty States have now adopted the same principles, to some extent at least, either by providing State appropriation

or State supervision, or both." Officers were re-elected as follows: President, James H. MacDonald, New Haven, Conn.; secretary, William L. Dickson, Springfield, Mass.; treasurer, Joseph W. Hunter, Harrisburg, Pa. The next meeting has not been decided upon, but will probably be in Atlantic City.

The annual meeting of the Iowa Electrical Association will be held at Clinton, Iowa,, April 18 and 19. L. P. Spinney, secretary, Iowa State College, Ames, Ia.

The annual meeting of the National Fire Protection Association will be held in New York City May 22 to 24. W. I. Allen, secretary, 24 Park Place, New York City.

The semi-annual meeting of the American Society of Mechanical Engineers will be held at Indianapolis, Ind., May 28 to 31. Calvin W. Rice, secretary, Engineering Societies Bldg., 39 W. 29th St., New York, N. Y.

The proceedings of the second convention of the National Association of Cement Users, held at Milwaukee, Wis., January 9 to 12, 1906, "edited by the president," have just come to hand, bearing the date line 1906. No particular reason for the long delay is apparent, and the advancement in cement knowledge is so rapid that the rather elementary papers which form a considerable part of this volume are already out of date, hardly justifying the copyright taken out, which, by the way, can hardly cover the frequent publications of papers and discussions which were made long before this book was issued.

The headquarters of the League of American Municipalities, John MacVicar, secretary and treasurer, have been transferred to New York City, and the office is now at 611 Trinity Building.

The National Electric Light Association will hold its thirtieth convention at Washington, D. C., June 4 to 7, 1907. The question box, under the charge of Paul Luepke, editor, is of much importance, and a list of nearly 500 questions has been sent out to members and others for replies. It is proposed to add to the replies references to periodical literature on the subjects of the respective questions.

The January number of the *Iowa Engineer*, the bi-monthly publication issued by the engineering department of the Iowa State College, Ames, Ia., contains the proceedings of the third annual convention of the Iowa Association of Cement Users, held at Ames, January 23, 24 and 25, having been delayed for this purpose.

The twenty-seventh annual convention of the American Water Works Association will be held at Toronto, Ont., June 11-15, 1907. The circular of announcement contains an invitation to members and others to send short practical descriptive papers during April for advance publication and distribution early in May. J. M. Diven, 14 George street, Charleston, S. C., is secretary.

The Toledo Society of Engineers, organized in December, 1903, has now about seventy-five members, and holds meetings on the second Friday of each month, at its reading room and library in the Y. M. C. A. building. The officers for 1907 are: President, A. H. Smith; vice president, H. E. Riggs; treasurer, C. L. Gates; secretary, John C. Oliphant; trustees, M. J. Riggs, F. I. Consaul, G. W. Tonson; representative to the association, E. O. Fallis.

The Indianapolis Technical Club has elected C. A. Tripp, M. E., president, and Arthur M. Hood, M. E., secretary and treasurer.

Maine Town Elections.

The town elections held in Maine, March 13, resulted in the election of officers as follows:

Abbott—Moderator, J. H. Blanchard; clerk, D. H. Buxton; treasurer, Geo. M. Perkins.

Addison—Moderator, Frank Thompson; clerk, V. C. Plummer; treasurer, E. E. Small.

Albion—Moderator, M. F. Hammond; clerk, J. E. Taylor; treasurer, Melton Chalmers.

Benton—Moderator, Otis G. Brown; clerk, H. A. Plummer; treasurer, O. S. Piper.

Bradford—Moderator, J. M. Mitchell; clerk, C. H. Robbins; treasurer, Luther Gary.

Brooks—Moderator, C. E. Lane; clerk, O. W. Lane; treasurer, C. O. Varney.

Canaan—Moderator, C. B. Gardner; clerk, J. Q. A. Butts; treasurer, R. H. Harris.

Charleston—Moderator, C. W. Bradley; clerk and treasurer, J. T. Dority.

China—Moderator, W. H. Jones; clerk, E. A. Cole; treasurer, E. T. Ripley.

Clifton—Moderator, M. F. Chick; clerk and treasurer, E. J. Penney.

Corinna—Moderator, C. L. Jones; clerk and treasurer, J. E. Gray.

Corinth—Moderator, C. A. Robinson; clerk, E. A. Cole; treasurer, C. T. Ripley.

Detroit—Moderator, C. T. Hawes; clerk, George L. Roundy; treasurer, J. R. Brown.

Dixmont—Moderator, L. P. Toothaker; clerk, L. O. Tasker; treasurer, A. F. Tasker.

Dover—Moderator, A. M. Warren; clerk, E. E. Whitney; treasurer, Walter H. Blethen.

Eddington—Moderator, J. H. Comins; clerk, F. F. Merrill; treasurer, A. F. Merrill.

Exeter—Moderator, J. W. Butters; clerk and treasurer, H. E. Butters.

Flagstaff—Moderator, D. A. Butler; clerk, Wm. M. Viles; treasurer, Leo V. Standish.

Fort Fairfield—Moderator, N. Fessenden; clerk, H. W. Berry; treasurer, D. H. Boyd.

Foxcroft—Moderator, W. E. Parsons; clerk, W. M. Steward; treasurer, W. S. Ham.

Frankfort—Moderator, J. S. Glidden; clerk, Harry Thompson; treasurer, Albert Peirce.

Garland—Moderator, Benjamin Prue; clerk, D. E. Knight; treasurer, L. A. Millett.

Hampden—Moderator, G. W. Smith; clerk and treasurer, F. L. Wyman.

Hancock—Moderator, O. W. Foss; clerk, H. C. Crabtree; treasurer, A. B. Crabtree.

Harmony—Moderator, W. H. Willis; clerk and treasurer, Chas. C. McLaughlin.

Hartland—Moderator, D. A. Packard; clerk and treasurer, Carl Randlett.

Hermon—Moderator, L. S. McLaughlin; clerk and treasurer, Thurston Hunt.

Hudson—Moderator, W. C. Whitcome; clerk, H. W. Smith; treasurer, Bert Briggs.

Jackman—Moderator, Frank R. Holden; clerk, Joseph D. Chamberlain; treasurer, R. Gilman.

Jackson—Moderator, E. E. Morton; clerk and treasurer, R. E. Page.

Jefferson—Moderator, W. B. Jackson; clerk and treasurer, G. A. Hoffses.

Knox—Moderator, A. M. Shibles; clerk, Barak Shibles; treasurer, Fred Braddock.

LaGrange—Moderator, F. H. Savage; clerk, C. L. Doble; treasurer, H. A. Fowles.

Lake View—Moderator, H. R. Riggs; clerk, A. P. Cook; treasurer, George W. Whitney.

Levant—Moderator, G. M. Hodgdon; clerk, C. F. Wilson; treasurer, E. C. Henderson.

Monroe—Moderator, H. R. Davison; clerk, F. L. Palmer; treasurer, A. H. Mayo.

Oakland—Moderator, J. B. Reardon; clerk, A. H. Lord; treasurer, Hiram Wyman.

Orland—Moderator, John Ames; clerk, E. O. Sugden; treasurer, J. M. Bray.

Orrington—Moderator and treasurer, A. G. Dale; clerk, H. J. Nickerson.

Palermo—Moderator, Samuel Marden; clerk, George M. Crommett; treasurer, S. B. Jones.

Parkman—Moderator, W. R. Coburn; clerk, S. A. Buzzell; treasurer, F. S. Murray.

Pittsfield—Moderator, T. W. Manson; clerk, T. E. Getchell; treasurer, H. F. Libbey.

Prospect—Moderator, W. S. Hillman; clerk and treasurer, A. A. Ginn.

Randolph—Moderator, F. A. Ayer; clerk and treasurer, A. C. Clark.

St. Albans—Moderator, E. A. Southard; clerk, D. L. Trost; treasurer, C. A. Southard.

Searsport—Moderator, F. H. Park; clerk, Wm. M. Parse; treasurer, C. O. Sawyer.

Sebec—Moderator, Walter S. Ladd; clerk, D. L. Annis; treasurer, A. D. Ladd.

Steuben—Moderator, J. V. Whitten; clerk, S. G. Cushman; treasurer, A. F. Smith.

Sullivan—Moderator, E. E. Bragdon; clerk, C. W. Havey; treasurer, H. H. Havey.

Troy—Moderator, R. E. Stone; clerk, Clarence Whitney; treasurer, Lute L. Rogers.

Waldo—Moderator, Edward Evans; clerk, L. M. Bryant; treasurer, C. H. Smith.

Wellington—Moderator, John Davis; clerk and treasurer, Isaiah Whitehouse.

Willimantic—Moderator, H. V. Hatheway; clerk and treasurer, C. C. Norton.

Winterport—Moderator, Elery Bowden; clerk, D. M. Spencer; treasurer, C. C. Moody.

Personal Notes.

R. E. Meade has been elected city engineer at Ensley, Ala.

Julian Smith has been re-elected city engineer at Selma, Ala.

Henry Esty has been elected city engineer at Malden, Mass.

E. E. Stauffer has been elected surveyor of Boyestown, Pa.

William H. Stevenson has been elected mayor at Lock Haven, Pa.

R. H. Evans has been re-elected city engineer at Haverhill, Mass.

T. J. Moreland has been elected city engineer at Park City, Tenn.

Hon. Edgar F. Hanson was inaugurated mayor at Belfast, Me., March 19.

George A. Carpenter has been elected city engineer at Pawtucket, R. I.

Julian Kendrick has been re-elected city engineer at Birmingham, Ala.

S. Cameron Corson has been re-elected borough engineer at Norristown, Pa.

G. F. Drum, of Newark, N. J., has been elected county engineer of Essex county, New Jersey.

W. F. Ernst, contractor for sewers, paving and cement work, Port Huron, Mich., died February 10.

Smith & Wells, an engineering firm of Wilkesbarre, Pa., has been elected borough engineer of that city.

Michael Liebel, Jr., was elected mayor, at Erie, Pa., to fill the unexpired term of the late Robert J. Saltsman.

Hon. George Wilcox, mayor of Summit, N. J., died at his home in that city March 20, of heart disease, aged 68 years.

Fred L. Smith has been elected mayor, Philip Bachman city treasurer, and Christ. Webber city controller, at Hazleton, Pa.

Luther Dean has resigned as city engineer at Taunton, Mass., to enter the employ of street railway interests in Dallas, Tex.

Webster Gazley has been appointed associate engineer in connection with the work on the new filter plant, at Louisville, Ky.

Horatio Seymour, M. Am. Soc. C. E., formerly State Engineer of New York, died at his home in Utica, N. Y., recently, aged 53 years.

Prof. D. J. McAdam has been elected county engineer of Allegheny county, Pennsylvania, to succeed Charles Davis, who died recently.

Christopher Harrison has been reappointed city engineer at Everett, Mass. This is Mr. Harrison's ninth consecutive term in this office.

Murphy Bros., manufacturers of sewer pipe, flue linings and all fire clay products, have moved from 44 Lombard Building to 712-714 Pythian Building, Indianapolis, Ind.

George L. Watson has been appointed consulting engineer for the Seaboard Cement Stone Company, of Holly Beach, N. J., and has charge of the Philadelphia office of the company.

E. M. McIlvain, formerly president of the Bethlehem Steel Company, has been elected president and general manager of the Robins Conveying Belt Company, Park Row Building, New York City.

Charles C. Barrett, of Rochester, N. Y., has been appointed assistant superintendent of public works for the western division of the New York State canals, to succeed William H. Nicholoy, resigned.

City engineers have been elected as follows:

Oakland, Cal.—F. C. Turner.
Lewiston, Me.—John A. Jones.
Auburn, Me.—Rodney A. Swift.
Quincy, Ill.—F. L. Hancock.
Westfield, Mass.—Oren E. Parks.

MACHINERY AND TRADE

A Waterproof Concrete Block House.

The accompanying photograph shows a concrete block house built for the manager of the Sandusky Portland Cement Co., using 1 per cent of Medusa waterproofing compound, or four pounds for each barrel of cement. This was used in the facing of the blocks and the house is reported to be perfectly dry and to be plastered directly on the walls, no furring or lathing having been used. This cut is referred to in the "Question Department on page 247, but was received too late to be inserted at that point.

A WATERPROOF CONCRETE BLOCK HOUSE.

Cement-Making Machinery.

The Power and Mining Machinery Company, of Milwaukee, Wis., have just issued their catalogue 7, devoted to cement-making machinery. It shows a complete line of machinery for the production of Portland cement by either the wet or the dry process. It is a fine example of the engravers' and printers' art and is a credit to its author, on account of its full and clear descriptions of methods and machines. It is fully illustrated with photographs and drawings of established plants, as well as of machines, single and in combination.

The McCully gyratory rock and ore breaker is made in twelve sizes, with capacities ranging from 5 to 1,500 tons per hour, the smallest sizes of product which can be made at one break ranging from ¾ inch for the No. 1 machine to 6 inches for the No. 12. Five sizes of fine crushers are made on similar lines, the smallest total product ranging from 100 per cent. passing a ½-inch screen in No. 1 to 1-inch screen in No. 6, with 25 per cent. passing a ⅛-inch and a ¼-inch in the two numbers, respectively.

Crushing rolls in two styles are made, to still further reduce the product.

A very interesting piece of grinding machinery made by this company is the ball-tube mill for the coarse grinding of cement clinker. It is said to have double the grinding capacity per horse power of the old ball mill. The dimensions of this mill are 7 by 7 feet, and the passage of the clinker through this length and diameter of mill is sufficient in length to permit the use of a steel plate to retain the balls and the omission of the screens required in the old ball mills.

A line of tube mills completes the grinding apparatus made by the company.

There is a full line of quarry cars, con-

veyors, elevators, screens and feeders for serving the machines described in the catalogue, also mixing mill for clay, rotary dryers and rotary kilns. Such special apparatus as discharge end for wet tube mill, steel balls, inclined vibrating screens, air separators, coolers, clinker conveyors, belt conveyors, coal crushers and automatic scales are also shown, and the use of the company's Loomis-Pettibone gas apparatus for power production is strongly recommended.

Copy of the catalogue will be sent on application by any one interested to the Power and Mining Machinery Company, at Cudahy, which is a suburb of Milwaukee, Wis., where the works and office are located.

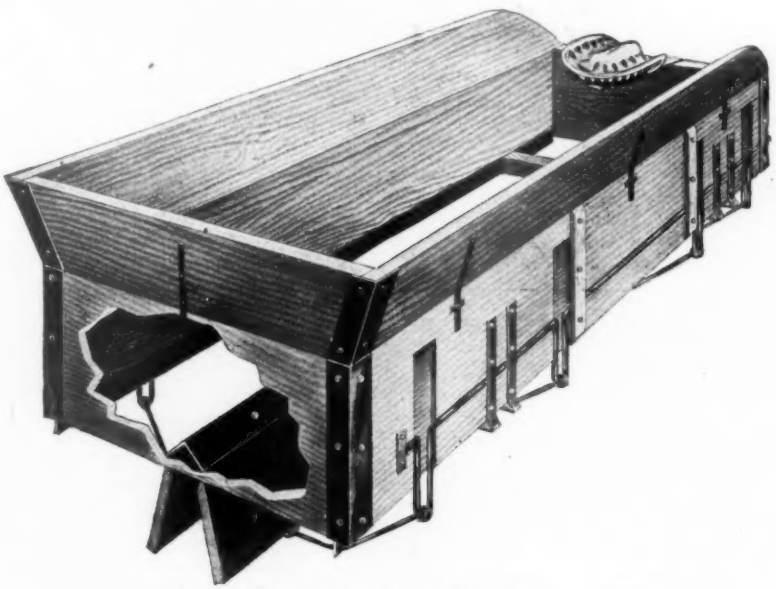
The Chicago Quick Dumper.

A new dumping wagon bed which is making its way on the market by virtue of its merits is the Chicago Quick Dumper, made by the Black Manufacturing Company. It is made to fit any gear with a reach and of sizes from one to five yards capacity. The load is equalized over the two axles and the claim is made that this is the only dump wagon of which this can be said. The effect of this is to place the load nearer the team, thus reducing the draft materially, the makers say from 35 to 50 per cent.

The illustrations of the wagon show that it has no chains, ratchets or complications of mechanism, and there are no castings. The result is that a ten-year-old boy can operate the wagon with ease.

The bottom of the wagon is level and it dumps by dropping the outer sides of the two bed boards, which revolve about axes in the middle of the bed, as shown in the illustration. This is effected by pulling a crank up two or three inches. Part of the load is dumped in front of the front axle, part in rear of the hind axle and part between the axles, by virtue of the location of the bed on the axles. The wagon will distribute its load by keeping the team moving and gradually pulling the crank.

Garfield Park, Chicago, has some small beds in use in place of the old two-wheel dump carts for hauling refuse and road scrapings and a large one for hauling crushed stone. The Knickerbocker Ice Company, Rockford, Ill., and Madison, Ind., are satisfied users of the wagons. Having been just put on the market, the reputation gained at these places will doubtless aid in extending rapidly the use of the wagon.



THE CHICAGO QUICK DUMPER.

The Black Manufacturing Company, 44 South Canal street, Chicago, Ill., will give full information about sizes, styles and prices.

An Evener for Four-Horse Team.

Carl W. Moe and Charles H. Norblom, of Minneapolis, Minn., have patented an evener for use with a four-horse team which seems to give good satisfaction.

If one end of the evener is tilted forward by the horse attached thereto, the pull of the rest of the team will be applied to the other end of the evener to hold the horse back, and compel the even distribution of the load. The same is true of either team. This saves the horses, as a horse that is weak can keep his load up in good shape, and both teams must pull together.

The Latest Studebaker Dump Wagon.

Since the Studebaker Vehicle Works had their beginning fifty-five years ago, in a country blacksmith shop at South Bend, Ind., it has never been their policy to stand still. President J. M. Studebaker said in a public address last summer that he never yet had seen the time when he could say he was satisfied, and he never expected to see it. It has been this constant endeavor to do things just a little better that has been largely instrumental in maintaining the high standard of efficiency and quality of the Studebaker products and in building up their immense business.

THE STUDEBAKER DUMP WAGON.
End View.

This policy of constantly striving to produce something better is apparent in every department of the Studebaker plant, and in no part of the factory is it more noticeable than in the branch of the business devoted to the manufacture of dump wagons. For several years past they have been making an exhaustive study of the dump wagon question, and as a result are to-day able to offer to contractors a dump wagon that satisfies the requirements of modern contracting methods.

Many contractors have learned to their cost that the dumping mechanism is not the only important part of a dump wagon. The finest dumping attachment ever invented, in connection with a poorly constructed gear, would be a disappointing failure. So, in the first place, the wheels on the improved Studebaker Ideal are built to stand up under the hardest kind of wear. The front gear has full circle oscillating fifth wheel. This permits the front wheel on either side to drop into a depression or run over an obstruction without disturbing the level of the body. The load is drawn directly from the front axle instead of from the hounds—a most worthy improvement. The rear axle is arched, thereby permitting shorter coupling, consequently lighter draft, and also insuring clearance, making it impossible to stall a team on the dump.

The dumping attachment is operated from the driver's seat. It is very simple and absolutely positive in its action. A chain is attached to the front roller, and, passing down over rollers to one of the trap doors, follows along its entire length, thence over rollers and a pulley attached to the rear end of bed, and along the full length of the other door and back again to the front roller, making practically an endless chain. One end of this chain, winding upon a slightly larger roller circumference than the other, closes one door in advance of the other. The bottom doors are covered with a high quality of heavy sheet steel. Over the inside edge of the trap door closing first this steel projects about one and one-half inches, so that when the doors are closed this projection laps over the other door, effectually closes the opening, and makes a tight bed that will not leak. By the

use of the endless chain device for closing the trap doors all necessity for adjustment of any kind is avoided and the doors are always tightly closed. Attached to the dumping lever is a safety device, making it impossible to accidentally dump the load. The trap door sills are made of heavy angle iron, and underneath them passes the endless chain. Metal loops serve to retain the chain in place. The trap doors are suspended by four, instead of three, heavy hinges on each side. The body is made of well-seasoned, bone-dry hardwood.

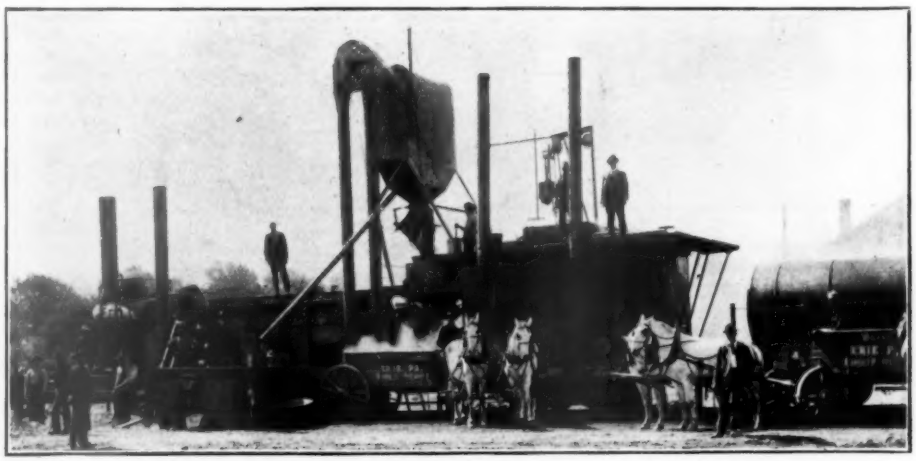
It is not possible to adequately describe here the many advantages of the Improved Studebaker Ideal Dump Wagon. The wagon must be seen to be appreciated. It is made in two sizes, 1½ and 2-yard capacities, respectively, stroke measure.

of topping was being discharged into the wagon, and shows the new Hetherington mixer delivery apparatus receiving the material from the mixer and delivering it into the wagon.

This device has proven to be an entire success, and is in much favor with those who use it for the reason that the process of mixing is performed in a much more perfect manner than when the mixer is discharged directly into the wagon.

A New Portland Cement Plant.

The work on the factory of the Dewey Portland Cement Company, Dewey, I. T., is progressing rapidly, but the plant will not be completed and in operation until July 1. Throughout the plant steel and concrete bins are being built with an aggregate capacity of 30,000 tons, in addi-



HETHERINGTON ONE-CAR RAILWAY ASPHALT PLANT IN OPERATION.

A New Hetherington One-Car Asphalt Plant.

The accompayning illustration shows the Hetherington one-car railway plant owned by Messrs. Mayer Bros., of Erie, Pa., as it was being operated in the city of Marion, O., last season, in the work of laying 8,000 yards of asphalt pavement on Windsor street. Mr. Mayer writes as follows:

The photo shows us at work turning cut the asphalt topping for the paving of Windsor street. We were just ten working days laying this surface, three days laying the binder and seven days laying the topping. We used Bermudez asphalt and the city authorities were very much pleased with the workmanship and the celerity with which the work was done.

The illustration was made from a photograph taken at the instant a mixer full

tion to the finished cement storage of 100,000 barrels.

Large crushing plant and steam shovels are expected to greatly reduce the cost of quarrying. The main crusher has a capacity of 700 tons per hour.

All of the buildings will be constructed of steel and concrete. The power house is about ready to receive the engines and electrical apparatus, consisting of four 600 h. p. engines and one 75 h. p., also four direct connected 600 h. p. and one 75 h. p. alternating current generators.

The property consists of 300 acres, 40 acres being the factory site, an adjacent 20 acres being platted on which have already been built modern residences and two hotels for employes. Natural-gas mains, also an elaborate water system, will serve the entire plant and town site.

The balance of the property, 240 acres, contains the rock and shale deposits.

The works have direct switches from the M., K. & T. and the A., T. & S. F. railroads.

The Helm Cement Brick Machine.

The Helm Cement Brick Press, which is said to have been the first press placed on the market for making pressed cement brick by hand power, is now entering the fourth season. These machines are now in operation in thirty-seven States, with as high as twenty-one plants to a State, as well as being sold in Canada, Mexico and other foreign territory.

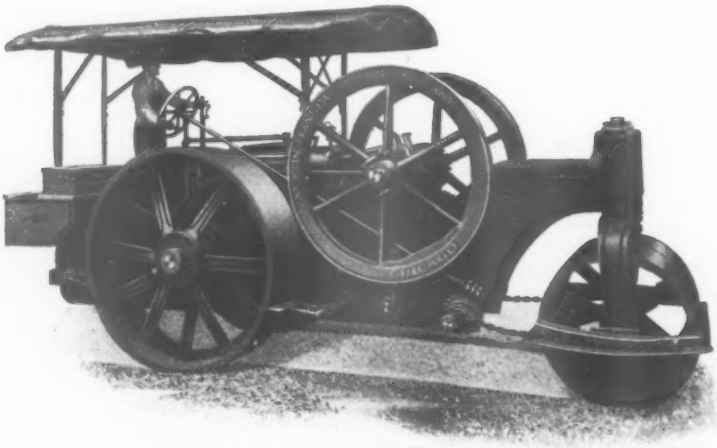
This machine presses ten brick at once, face up, so they are easily faced. A heavy, uniform pressure is applied. The manufacturers demonstrate that three men will produce 10,000 high-grade brick a day with this machine.

It is claimed that by pressing the brick and making them face up, with plungers in contact with the material for so short a time, it is practical to use the medium wet mix, which, in connection with graded materials, secures true concrete and the greatest possible strength. There are no troweled, stroked or tamped surfaces to this product. It gives high results from tests in compression, transverse strength and absorption.

The manufacture and sale of this machine east of the Mississippi river are controlled by the Queen City Brick Machine Company, and west of that river by the Helm Brick Machine Company, both of Traverse City, Mich.

The former also offer a complete line of concrete machinery for the brick and block plant, including mixers for hand and power operation, on both batch and continuous principle, two-piece, triple air space block system and special molds and conveyors.

The two-piece triple air space block is sold under a guarantee that moisture will not pass through it. This feature, it is claimed, makes it unnecessary to fur and lath, the plaster being applied directly to the inner wall. The wall is composed of a hollow outer wall and a hollow inner wall, with a continuous air space between the two, while each block binds on three others, making a very strong wall.



THE AUSTIN-WESTERN MOTOR ROAD ROLLER.

The First Gasoline Motor Road Roller.

The Austin-Western Company, Manhattan Building Chicago, Ill., are sending out advance circulars describing their new American Motor Road Roller, which is the first roller of the kind made in this country. The company, in designing the machine, have, they say, taken advantage of the experience with gasoline motor rollers in France and England, where they have met with a successful experience, and have combined therewith the advances in gasoline motor construction made in this country. The result is a roller which promises to be a great advance in many particulars over the steam roller for road making and repairing. The accompanying cut shows the simplicity of the construction and the general style of the design. The line now in process of manufacture includes four sizes, weighing 7, 10, 12 and 15 tons.

Some of the advantages of the motor roller may be stated as follows: It is without smoke, steam, sparks or soot, and requires no water, the motor being oil-cooled. It thus saves the expense of

teams and men to haul water and coal. It loses no time in raising steam or in waiting for boiler repairs. It has no risk of boiler explosion, and does not require a specially licensed engineer. The gasoline tank on the engine carries enough fuel for 10 hours' run on full load or 15 to 20 hours on lighter load, thus saving time in loading up with coal and water. A separate tank of small size can be hauled on a separate truck and furnish fuel for one to three months' work. Denatured alcohol can also be used for fuel.

The frame of the roller is seen from the cut to be powerfully trussed and durable. In a steam roller the boiler is required to carry much of the strain which the frame should carry, but in the motor roller the frame carries all the load and the strains of the operation of the machine, and is designed expressly therefor. The changes in temperature in a boiler and the consequent racking of the parts produce defects in the adjustments which will not occur where the frame has the one office of carrying the load to the rollers and is designed for that purpose only.

There is no loss of fuel when the motor is not running, and none from banking fires for a few hours or over night, and there is no necessity of watching steam and water gauges and fires to prevent explosions.

There are but two valves, operated by a single cam, and the start, stop and reverse are controlled by a single lever, making the control the simplest possible. Speed is varied at will by a slight lever movement. The weight on the roller remains in the same position at all times and can be exactly placed.

The Austin-Western Company, Manhattan Building, Chicago, Ill., will give full information about details of construction and use of the roller.

Tools for Comfort and Speed in Sidewalk Work.

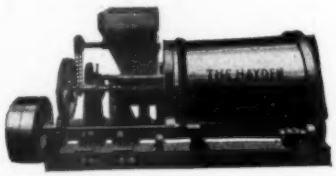
Mr. P. F. Connelly, of Sioux Falls, S. Dak., who has recently put on the market some tools for cement sidewalk makers, which add greatly to the comfort and speed with which work can be done, reports many orders received already, although his first advertisement appeared in MUNICIPAL ENGINEERING only two months ago. His latest patent is dated January 29, 1907, so that he is getting the returns from his inventive genius very promptly.

The long handle saves the finisher's back and knees, and at the same time makes greater speed possible. Mr. Connelly claims several times as much work as is ordinarily accomplished with the common short-handled tools. The tools are now made with threads on the outside to screw into the socket on the handle, instead of having the socket on the tool. The pointing tool shown in this department in the March number is made on this principle, and the drawing shows it. All the others are now made in the same way, fitting the same handle, and quickly changed as the work requires. Mr. Connelly will give full information on request.

The Hayden Concrete Mixer.

The accompanying illustration shows the new type of concrete mixer which is now being placed on the market by the Hayden Automatic Block Machine Company, of Columbus, O., makers of the well-known Hayden down-face block machine.

This machine, as the cut will show, is simple in design, correct in construction, and competent judges claim it has reached the highest point of efficiency for



THE HAYDEN CONCRETE MIXER.

mixing concrete of any machine now on the market. It is quite rapid in its work, and at the same time is very precise in proportioning the proper mix. One of the attractive features of this machine is the fact that the character of the mix, or the consistency of the output, can be easily regulated, and either a dry mix or a wet one produced, whichever is required for the character of work being done. The machine is meeting with great favor with every one that is interested in up-to-date concrete machinery.

An Exhibit of Reinforced Concrete Construction.

The catalogue of the Expanded Metal and Corrugated Bar Company, of St. Louis, Mo., for 1907, has just been issued. It contains a number of new illustrations of concrete work done with the corrugated bar as reinforcement, showing the new applications of reinforced concrete in old and new fields. The book also contains the standard information about the use of the bars, and formulae and tables for designing work in which they are used. A copy of the handsomely illustrated book will be sent on application to the company at 925 Frisco Building, St. Louis, Mo., or to any of its numerous representatives in this and other countries.

Sarco for Waterproofing Aqueducts.

One of the uses of sarco, the asphalt product of the Standard Asphalt and Roofing Company, of Chicago, Ill., is for making concrete waterproof. It is applied to the waterproofing of such structures as bridges and aqueducts. The accompanying photographs show the stages of the process which is followed. They show the waterproofing work done on the aqueduct of the Indianapolis Water Company, carrying its water supply canal over Fall creek.

WATERPROOFING INDIANAPOLIS AQUEDUCT.
Placing Asphalt and Burlap on Bottom.

WATERPROOFING INDIANAPOLIS AQUEDUCT.
Placing Sand Surface.

The first two cuts show the method of waterproofing the floor. The aqueduct is of concrete. The floor was first painted with asphalt and then a layer of burlap was laid in the hot asphalt. The process of placing the asphalt and burlap was going on when the first photograph was taken. Then a layer of asphalt a quarter of an inch thick was laid, and on top of this a layer of sand. The second photograph shows the placing of the sand.

The side walls were treated in a similar manner, first the asphalt paint, then the burlap and then a coating of ⅛ to ¼ inch of asphalt. To help keep the burlap and the outer coat of asphalt in place the burlap is held in place by a strip of iron bolted to the concrete at the top. One suggestion for future work is made on account of the result of setting the bolts holding this strip: not to set them in sulphur, as the sulphur has a destructive effect upon the asphalt immediately adjoining. The third photograph shows the steps of painting the concrete wall and fastening the burlap in place. It also shows the painting of the iron railing with asphalt paint.

Enlarged Use of Tarvia, the Dust Layer.

With the coming of another automobile season many people, especially householders who live near automobile thoroughfares, as well as the automobilists themselves, will look forward with dread to the summer dust nuisance.

Many automobiles are nowadays so designed that the occupants are not bothered by the dust of their own machines, but they cannot escape that of other vehicles on the road. As for the inhabitants of the neighborhood, they suffer constantly, and the coming of the automobile in such localities has depreciated instead of increased the value of property in many cases. Everybody has seen such roads, where clouds of dust hang for many minutes in the air after the passage of a single automobile. Sprinkling is expensive, and, instead of decreasing the nuisance, actually increases it. The constant use of water on the road breaks up the natural bond of the top dressing so that mud is formed, which soon becomes dust again in the hot sun. Roads which are regularly sprinkled require resurfacing much oftener than roads which can be left to themselves.

Oil for the purpose of suppression of dust has been used in many localities, especially in California, where it is exceedingly cheap. It is only partially effective and develops another nuisance on account of the damage it does to vehicles and to garments.

One of the best of the propositions for the suppression of dust, and one which is recommended by the United States Department of Agriculture, is a tar preparation of the right grade and character. One of these is sold by the leading manufacturers of coal tar products under the name of Tarvia, the makers having made prolonged experiments to determine which of the various tar compounds is best adapted to the purpose.

In France this material has been used since 1900, when the League for the Suppression of Dust first reported successful experiments with it. This league was formed to abate a dust nuisance which was rapidly making the Riviera positively unpleasant in many sections, seriously damaging property values at the great resorts of that district. The use of Tarvia was so successful that it was adopted with modifications in all the departments of France, and it is now the standard method of preserving macadam roads throughout the French Republic.

It has been found, as set forth in many American consular reports, that the use of tar of the right kind results in economy of maintenance of upwards of 25 per cent., wear of the road is to a large degree prevented, and damage by water is altogether avoided. Roads which formerly used to be sprinkled several times a day can now be left without any sprinkling, despite heavy automobile traf-

WATERPROOFING INDIANAPOLIS AQUEDUCT.
Painting and Placing Burlap on Side Wall.

fic, and no dust is created. In this country successful experiments have been made by the Department of Agriculture at Jackson, Tenn., and by several of the State engineers. Almost a million yards of park roads and automobile thoroughfares of America were treated with Tarvia during 1906, and the authorities of several cities have announced a decision to make use of Tarvia on every macadam road under their supervision.

Tarvia is applied hot to the macadam during a spell of warm, dry weather. It filters into the top surface of the macadam and strengthens the natural bond of the stone, giving it an appearance resembling asphalt and capable of receiving equally heavy traction without sustaining damage. An annual application of Tarvia is sufficient to keep a road in splendid condition, free from side washing or raveling, and absolutely dustless.

A tarviated road can be swept with street sweepers' brooms or flushed with a hose without damage, and on many tarviated streets this is done occasionally to alleviate the duts blown on by wind or carried on the road by regular traffic. Wherever roads are properly maintained, especially in such places as city parks and parkways, Tarvia effects considerable saving.

Trade Publications.

The Western Cement Company, 247 West Main street, Louisville, Ky., has issued a booklet, dated 1907, entitled "Some Recent Tests of Louisville Hydraulic Cement," which shows the properties of this kind of cement and the very favorable comparisons of long time tests, up to ten years, with Portland cements, the mortar briquets showing superiority of natural cements after about five years. This should have some effect upon the use of natural cement for the many structures to which these results can be applied, to show the economy of the same. There is also a circular regarding Speed Portland cement for sidewalks, which is made in the same district by the same interests.

The Newsom Crushed Stone and Quarry Company, Nashville, Tenn., issue their catalogue 1, with the purpose of showing the quality of work which can be done with concrete blocks. The photographs shown are very satisfactory, with one exception. They all show the deadening effect upon the larger unbroken areas in a wall of rock-face blocks, which, no matter how numerous are the faces used, give the effect of uniformity in size of blocks and in form of face. This is just what the natural rock-face cannot do and what gives it whatever value it has. For this reason the natural rock-face wall cannot be successfully imitated.

The Demorest Little Giant concrete mixer is advertised by cards showing pictures and letters of commendation, as well as the regular catalogue of the Ballou Manufacturing Company, of Grand Rapids, Mich.

A pamphlet on economical steam production, or the difficulties of the boiler room scientifically solved, is issued by the Vulcan Soot Cleaner Company, of Pittsburg, Pa.

The latest bulletin of the Association of American Portland Cement Manufacturers, No. 13, is by Sanford E. Thompson, and is the paper on "Forms for Concrete Construction," presented before the National Association of Cement Users. It can be had on application to the secretary, Land Title Building, Philadelphia, Pa.

The Bay State brick and cement coating is described in a circular issued by Wadsworth, Howland & Co., Boston, Mass.

Trade Notes.

BRICK.

Crawfordsville, Ind.—C. E. Poston, of this city, will build a paving brick plant at Attica, Ind., duplicating the plant of the Poston Paving Brick Co., of this city. He is proprietor of the proposed new plant.

CEMENT.

Stanton, Ia.—The Patrick Cement Co. will begin at once the erection of a plant for the manufacture of Portland cement near this town. J. C. Patrick is president, and J. H. Norwood is secretary of the company.

Earlham, Ia.—A cement plant is proposed here.

Le Mars, Ia.—Kramer & Lake, cement dealers, have dissolved partnership, Mr. Kramer succeeding.

Alta, Ia.—Aden Mukley has sold his cement works to J. H. Wadsworth, who will continue the business.

Anacortes, Wash.—Andrew Chilberg, of Seattle, and others are establishing a cement mill on the Baker river, near here.

Kendall, Wash.—The Northwestern Portland Cement Co. will establish a modern cement plant here.

Boulder, Mont.—The Boulder Lime Co. will add the manufacture of cement and cement brick to its lime plant.

Harvey, Ia.—John Newburn, of Des Moines, and W. E. Foshier, of this city, have secured options on 1,200 acres of land here, and contemplate the establishment of a cement plant.

Kansas City, Mo.—The Blue Seal Portland Cement Co. of this city, has been organized, and will erect a plant at Courtney, Mo., about 11 miles east of here. The main offices will be in the New York Life Building, Kansas City. The officers of the company are: President, Robert G. Weber; vice president and general manager, John H. Marshall; secretary, John W. Schroeder; treasurer, Lloyd H. Weber.

Provo, Utah.—Allan G. Lamson, of Salt Lake City, has secured 17 limestone quarries, covering about 3,000 acres of

land, located between Provo and Rock canyons, and will establish a cement plant.

Baltimore, Md.—The John S. Bullock Lime and Cement Co. has been incorporated by James H. Parrish, Edward M. Parrish, Edith May Bullock, Charles T. Davis and William M. Kerr.

Bonner Springs, Kans.—The Bonner Portland Cement Co. has been organized and will purchase a large tract of land along the bluffs north of Kaw river, for the erection of a cement plant.

Duluth, Minn.—The establishment of a cement plant here for the manufacture of cement from furnace slag is contemplated.

Peru, Neb.—A local company has been formed and contemplates the establishment of a cement plant here.

Bellingham, Wash.—The Peninsular Portland Cement Co., of Jackson, Mich., contemplates establishing a cement plant here if satisfactory arrangements can be made for freight rates. Baldy & Vaughn are the local representatives of the company.

Chanute, Kans.—Work of construction has begun on the plants of the Chanute Cement and Clay Product Co. and the Chanute Brick and Tile Co.

Reading, Pa.—The big cement plant of the Lehigh Portland Cement Co., at Chapman's, will be ready to resume operations April 1.

Montreal, Que., Can.—The Lakefield Portland Cement Co., of Lakefield, will erect a branch cement plant in this city.

Morgan, Utah.—The large Portland cement plant at Devil's Slide, 9 miles east of this city, will be increased.

Logan, Mont.—The Union Portland Cement Co., of Ogden, Utah, will erect a large cement plant 4 miles from this city. James Pingree will be manager.

St. Louis, Mo.—Special.—A. H. Craney, Jr., president of the St. Louis Portland Cement Co., advises us that the plant, assets and good will of the St. Louis Portland Cement Co., manufacturers of the Red Ring brand of Portland cement, have been purchased by the Union Sand and Material Co. In assuming title to the properties of the St. Louis Portland Cement Co., the manufacture of the Red Ring brand of Portland cement will be under the direct management of H. Struckmann, chief engineer and general manager, and the sales department under A. H. Craney, Jr., as heretofore. The company will immediately increase the capacity of the plant to 10,000 barrels per day. The new plant will be equipped with gas engines, and producer gas will be used as fuel for the kilns, the whole plant being driven electrically.

Jackson, Mich.—Special.—The J. E. Bartlett Co., recognized as the largest cement factors and distributers of building material in the State of Michigan, have opened an office in the Hodges Building, Griswold street, Detroit. In addition to being distributers for two of the largest cement mills, the company controls the output of several large brick plants located in Michigan and Ohio. The firm is composed of the following officers: President, J. E. Bartlett; vice president, E. J. Fogell; treasurer, C. B. Elwood; secretary, A. R. Rutledge; auditor, H. E. Morehouse.

Hammond, Ind.—Special.—The Sandusky Portland Cement Co. is furnishing Medusa waterproof compound for use in the extensive concrete work being done by the Standard Steel Car Co., of Hammond, Ind., where machinery foundations, elevator and belt pits are being waterproofed. They are also furnishing the compound to Cranford & McNamee, of Brooklyn, N. Y., who are using it to waterproof concrete mortar in the rapid transit tunnel job between New York and Brooklyn. The material is specified and being used in the new Olympic Club building at San Francisco, Cal.

Walkerville, Ont.—The Trussed Concrete Steel Co., Ltd., has been incorporated to manufacture concrete steel, by J. Kahn, D. C. Raymond and Charlotte L. Wyman.

CONCRETE BLOCKS.

Cullman, Ala.—The J. S. Fuller Construction Co. has purchased machinery and will manufacture cement building, curbing and paving blocks.

Upland, Neb.—A cement block plant is contemplated here.

New concrete block companies:

Cullman, Ala.—The J. S. Fuller Construction Co.

Lincoln, Ill.—Cadwallader Bros.

Guthrie, Okla.—The Concrete Construction Co. of Guthrie and San Francisco, Cal. J. C. Braden, E. Money, San Francisco; G. V. Pattison, Guthrie.

Springfield, Ill.—Concrete Products and Material Co. Joseph W. Vance, Boyle Vance, Wm. Bennett.

Cincinnati, O.—The Nottingham Concrete Block Co. G. P. Kurtz, E. Kurtz, W. A. Abbott, E. A. Rowe, T. J. Kurtz.

Chicago, Ill.—The Chicago Concrete Machinery Co. F. A. Peterson, F. A. Miller, E. R. Ede.

Scranton, Miss.—M. F. Petty.

Rice Lake, Wis.—George Raynor.

Baraboo, Wis.—A. S. Hawley.

Belle Plaine, Ia.—Belle Plaine Concrete Stone Co. F. H. Henry, James Park, Sam Ward.

Clear Lake, Ia.—Warren Machine and Equipment Co. L. S. Johnson and others.

Bemidji, Minn.—Foley Bros.

Mishicott, Wis.—Ira Beyer.

Culbertson, Mont.—J. T. Clapper, E. J. Williams and others.

Toronto, Ont.—The Standard Concrete Construction Co. F. Reilly, J. B. Bartrain, E. A. Scott.

Brockville, Ont.—The Brockville Cement Pressed Brick and Concrete Co., Ltd. B. Dielon, A. T. Wilgress, R. N. Norton, J. C. Yarwood, H. A. Barristor.

PURCHASE OF MACHINERY.

Watertown, S. Dak.—Special.—C. H. Englesby says a new cement company is about to be organized, and he desires to communicate with dealers in cement tools and supplies.

Youngstown, O.—Special.—J. W. Cumiskey, 351 Scott st., desires to purchase a second-hand 3 or 4-ton asphalt roller. Must be in good shape and a bargain.

Conway, Tenn.—This city contemplates the purchase of a rock-crushing outfit.

New York City.—Special.—Jacob Garlick, superintendent of the Vanderveer Canarsie Improvement Syndicate, 277 Broadway, advises us that the company is about to erect 100 houses of concrete blocks in Brooklyn. The houses are to be 1 and 2-family houses, 2 stories and cellars. Mr. Garlick has purchased a concrete block machine mixer and other materials which may be required in making up the plant for the manufacture of concrete blocks on the premises.

Mendon, Mich.—Special.—Will P. McCoy advises us that he is in the market for engineer's Y level, and cement machines and tools.

PURCHASE OF MATERIALS.

Brandon, Man.—Bids are asked until April 1 for furnishing 6,000 to 8,000 bbls. of Portland cement. W. H. Shillinglaw, cy. engr.

Tullahoma, Tenn.—Special.—H. M. Kimsey, of H. M. Kimsey & Sons, contractors and builders, and manufacturers of brick, desires best prices on carload lots of cement.

MISCELLANEOUS.

Indianapolis, Ind.—Murphy Bros., manufacturers of sewer pipe, flue linings and all fire clay products, have removed from 44 Lombard Building to 712-714 Pythian Building.

St. Paul, Minn.—The St. Paul Crushed Stone Co. has been incorporated by John B. Robbins, of Minneapolis, J. How and Wm. D. Mitchell, of St. Paul.

Cleveland, O.—The Lake and River Sand Co. has been incorporated by M. A. Callahan, Norman Callahan, R. M. Calfee, J. G. Fogg and A. M. Luchemeyer.

Chicago, Ill.—The Guaranty Engineering Construction Co. has been organized and will have offices in this city and Dallas and Houston, Tex. The company will design, construct and operate sewage purification works. John W. Maxcy, of Dallas, Tex., is president and general manager of the company.

Chicago, Ill.—The John Burke Roofing Co. has been incorporated to do roofing and paving, by John Burke, Wm. H. Naughton and Jacob C. Lemon.

Toronto, Ont.—The Excelsior Construction and Paving Co., Ltd., has been incorporated to manufacture, deal in, and construct cement and concrete works, walks and pavements, and deal in cement, etc., by J. G. Murphy, W. Mitchell and A. Murphy.

IMPROVEMENT AND CONTRACTING NEWS

PAVING.

Newcastle, Pa.—Members of the council visited Cleveland, O., March 27, to inspect various kinds of street paving materials.

Kansas City, Mo.—City Engineer Harper has requested owners and managers of cement plants, that sell materials to constructors of public works, to meet with him and devise some arrangement by which better account can be taken of the quality of the cement used, particularly in paving. Mr. Harper favors the establishment of a storage house for the reception of the entire amount of cement to be used on a job, and that it be tested by the city tester to determine its conformity to the specifications.

CONTEMPLATED WORK.

Wellsville, Pa.—Main st. will be macadamized.

Van Buren, Ark.—A paving district will be created.

Elkhart, Ind.—Paving is contemplated for S. Main st.

Bloomington, Ill.—Paving is contemplated for Clinton st.

Iola, Kans.—Council is considering a petition to pave Cottonwood st.

Bluffton, Ind.—City council will build 10 miles of cement sidewalks.

Ames, Ia.—About 2 miles of cement walk is contemplated. R. Maxwell, cy. clk.

Snohomish, Wash.—Vitrified brick paving is contemplated for First st.

Iola, Kans.—Resolutions have been passed for paving North and Jefferson sts.

Portsmouth, O.—Resolutions have been passed for paving Sixth, Young and Vernon sts.

Fullerton, Cal.—Will vote on the issue of $80,000 bonds for street improvements.

Mt. Sterling, Ky.—Will vote on the issue of bonds for paving the streets with brick.

Tulsa, I. T.—About $100,000 will be expended for brick paving. Michael Horan, cy. engr.

Cairo, Ill.—Paving is contemplated for Washington ave., from Second to Thirty-fifth. Mayor Parsons.

Jackson, Miss.—Council has decided to expend $7,000 for paving certain streets with brick.

Portland, Ind.—A resolution was adopted March 15 to pave ½ mile of W. Main st. with brick.

Spokane, Wash.—Plans will be prepared for grading and curbing Tokio st. and Pacific ave.

Chattanooga, Tenn.—Voted to issue $1,000,000 bonds for streets, sewers, city parks, etc.

Ossian, Ind.—Town council has decided that the property owners must pave their sidewalks.

Clay City, Ind.—Harrison twp. voted, March 19, to build an additional 25 miles of gravel road.

Bay City, Mich.—Paving is proposed for Van Buren st., from Columbus to Kosciusko aves., this year.

Evansville, Ind.—Asphalt paving is contemplated for Main st., from Water to Eighth sts. Mayor Bachne.

Washington, D. C.—The District Commissioners will repair and resurface the streets and roads.

St. Louis, Mo.—Protests will be heard April 5 on the proposed improvement of a large number of streets.

Mattoon, Ill.—An ordinance has been passed to pave an alley north of Broadway, from Fourteenth to Sixteenth sts.

Lima, O.—Ordinances were passed March 18 for paving Pine, Elizabeth, Metcalf and North sts. and Richie ave.

Bloomington, Ill.—The city engineer has been directed to prepare estimates for repaving W. Washington st.

Marion, Ind.—The Board of Public Works is considering a petition to pave Gallatin st., from Third to Tenth, with brick.

Davenport, Ia.—Brick paving is proposed for 3 alleys, and objections will be heard April 3. Hugo Moeller, cy. clk.

Albany, N. Y.—An ordinance has been passed to pave Western ave. with brick, with reinforced concrete culverts.

Sioux Falls, S. Dak.—A resolution has been passed to build a cement sidewalk on Sixth st. F. W. Pillsbury, mayor.

Rockford, Ill.—The outlying districts will make a great demand for new cement concrete and tar walks this year.

Eugene, Ore.—Council passed an ordinance, March 11, to pave Williamette st., from the depot to Eleventh st., with bitulithic.

Princeton, Ill.—Paving is contemplated for the entire business district. J. A. Brigham, L. A. Garwood, members coun.

Camden, N. J.—An ordinance has been passed to pave Ninth st., from Pearl to Vine, with asphalt. Chas. S. Wolverton, pres. coun.

Rock Island, Ill.—An ordinance has been passed to pave Seventh ave., from Thirtieth to Thirty-eighth, with asphalt. H. C. Schaffer, cy. clk.

Bridgeport, Conn.—The property owners on Fairfield ave. have asked for paving from Park to Clinton aves. Mayor Reynolds.

Hot Springs, Ark.—Plans will be made soon by G. M. French, cy. engr., for paving ¼ mile of Ouachita ave. Otis Copeten, cy. clk.

Mt. Washington, O.—Sealed bids will be received April 2 for the purchase of $1,176.91 sidewalk bonds. E. H. Stevens, vil. clk.

Elkhart, Ind.—City Engineer Smith was directed, March 21, to prepare plans and specifications for paving Crawford st. with macadam.

Portland, Ore.—Will vote in June on the issue of $1,000,000 for the purchase of parks and the establishment of a system of boulevards.

Peru, Ind.—Plans and specifications are being made for paving all streets, from Canal to Eighth, one block each way from Broadway. Cy. Engr. Horan.

Joplin, Mo.—An ordinance was approved March 20 for constructing concrete sidewalks in Sergeant ave., from Ninth to Tenth. Hiram Phillips, cy. clk.

Burkesville, Ky.—The Commercial Clubs of this city and Columbia, Ky., are planning to construct a turnpike road, 30 miles long, to connect the two towns.

Pine Bluff, Ark.—Bids will be asked in May for paving 14 blocks of Third st., 4 blocks of Walnut st. and 12 blocks of E. Second st. W. A. Lee, cy. clk.

Johnson City, Tenn.—An ordinance was passed, March 15, empowering Mayor Guy L. Smith to employ an engineer to prepare plans for paving the streets.

Plainfield, N. J.—About $40,000 worth of brick paving on concrete base and several miles of macadam are contemplated. A. J. Gavett, cy. surv.

Dayton, O.—Sealed bids are asked until April 11 for $45,000 bonds for improving certain streets and alleys and constructing sewer. Edward Phillips, cy. audt.

Rogersville, Tenn.—A corps of government surveyors has located a pike road in this county, and the report is to be given to the county court here in April.

Fremont, Neb.—City council adopted plans, specifications and estimates, March 12, for paving Main, Broad and Tenth sts. and Nye ave. Bids will be asked soon.

Marshall Creek, Pa.—The supervisors of Smithfield twp. desire to communicate with parties who would take a contract to operate their stone crusher. Norman Huffman, secy., Marshall Creek.

Pierre, S. Dak.—Special.—Edward K. Mather, cy. engr., says the grading of several streets, involving a large amount of earthwork, is contemplated. Bids will probably be received about July 1.

Dayton, O.—Bids will be asked soon for grading and cement sidewalk work for Berkeley subdivision (100 acres), for the Dayton Real Estate and Investment Co. Warren D. Riddell, C. E., U. B. Bldg.

Springfield, O.—A resolution has been adopted directing W. H. Sievesking, cy. engr., to prepare plans and specifications for paving Fisher ave., from Maine to Columbia sts. Frank Crothers, cy. clk.

Muskogee, I. T.—Council is considering a proposition of W. W. Cook & Son to pave the streets with brick, and an ordinance may be passed soon to pave 25 blocks of business and residence streets. Mayor Hubbard.

Mishawaka, Ind.—The committee on streets and alleys decided, March 19, to reject the bids for paving Front ave., Bridge st., and to ask for new bids. Asphalt paving is contemplated for Cedar st. Chas. Frank, mayor; Walter Michael, cy. clk.

Wheaton, Ill.—Plans and specifications have been completed for 7,000 sq. yds. of vitrified brick paving, with 4,300 ft. cement combined curb and gutter, and 31,500 sq. yds. of limestone macadam paving, with 21,000 ft. cement combined curb and gutter. Cy. Engr. Pront.

Kansas City, Mo.—This city proposes to revise the specifications under which asphalt pavements are laid, and the requirements from contractors will correspond with analyses of asphalt to be made by the city chemist, and samples of which will have to accompany each bid before a contract is let.

Lagrange, Ind.—Bids to be received about April 8, according to press reports, for paving Detroit st. with brick. Martin L. Swinehart, engr.; Spencer Copplin, cy. clk.

Grand Rapids, Mich.—A proposition is being agitated to do away with Monument Park, at the junction of Monroe and Coulton sts., and to pave the entire triangle, making it a business square.

Decatur, Ala.—A contract will be let in a few weeks for paving over 57,000 ft. of streets with sidewalks and curbing.

CONTRACTS TO BE LET.

La Crosse, Wis.—Bids are asked until April 15 for street grading. B. P. W.

Oakes, N. Dak.—Bids are asked until April 30 for constructing sidewalks. W. W. Denning, cy. audt.

Wausau, Wis.—Bids are asked until April 3 for paving materials covering 10,000 sq. yds. B. P. W.

Brownstown, Ind.—Bids are asked until 1 p. m., April 2, for constructing 4 gravel roads. Co. Commrs.

Huntington, W. Va.—Bids are asked until April 3 for repairing all county roads. F. F. McCullough, co. clk.

Warren, O.—Bids are asked until April 4 for constructing 16.75 miles of limestone pike. H. C. White, engr.

Washington, Pa.—Bids are asked until April 16 for constructing a number of roads. Wm. Wylet, co. road engr.

Oshkosh, Wis.—Bids are asked until April 8 for paving Jackson st. from Algoma to Irving with asphalt. B. P. W.

Cleveland, O.—Sealed bids are asked for paving Bricksville road. Julius C. Dorn, clk. co. comis.

Moorhead, Minn.—Bids are asked until April 8 for constructing tile and cement sidewalks. H. E. Roberts, cy. clk.

Trenton, Mo.—Bids are asked until April 15 for paving, curbing and guttering Chandler st. R. J. Pearson, cy. engr.

New Albany, Ind.—Bids are asked until April 6 for paving Market st. between State and Pearl with vitrified brick. B. P. W.

Brandon, Man.—Bids are asked until April 11 for supplying 6,000 to 8,000 bbls. of Portland cement. W. H. Shillinglaw, cy. engr.

Logansport, Ind.—Bids are asked until April 22 for constructing gravel roads. J. F. Grable, chm. co. com.; Geo. W. Cann, co. audt.

Green Bay, Wis.—Bids are asked until April 16 for grading and macadamizing E. Mason st. from Adams st. to Webster ave. Cy. clk.

Marinette, Wis.—Bids are asked until 2 p. m. April 6 for brick paving on Ogden ave. and macadam on Park Ridge ave. and 11th st. B. P. W.

Des Moines, Ia.—Sealed bids are asked until April 4 for curbing 1,304 ft. of University ave. with Portland cement. W. W. Wise, chm. B. P. W.

Lansing, Mich.—Bids are asked until 7:30 p. m. April 2 for paving Main st. from Division st. to Washington ave. with brick. Myle F. Gray, cy. clk.

South Bend, Ind.—Bids are asked until April 2 for constructing 19,000 sq. ft. of cement walk and 2,000 ft. of cement curb. A. J. Hammond, cy. engr.

Petersburg, Ind.—Sealed bids are asked until 2 p. m. April 2 for constructing macadamized roads. W. W. Shy, chm. co. com. F. R. Bidderback, co. audt.

Bucyrus, O.—Bids are asked until April 4 for paving Charles st. from Jones st. to Ridge ave. with brick. F. E. Donnenwirth, clk. B. P. S.; C. A. Guiss, cy. engr.

Covington, Ind.—Bids are asked until April 2 for constructing 4½ miles of crushed stone and 4 miles of gravel roads. Wm. B. La Barr, co. surveyor, Veedersburg.

Versailles, Ind.—Sealed bids are asked until 1 p. m. April 2 for constructing 5 miles and 4,200 ft. of macadamized road in Laughery twp. Nichols Votz, co. audt.

Ashland, Ky.—Bids are asked until April 17 for 30,000 sq. yds. of brick paving on concrete base and 19,000 lin. ft. concrete curb and gutter. J. W. Bosley, cy. engr.

Ottawa, Kan.—Sealed bids are asked until 5 p. m. April 3 for 13,000 sq. yds. of vitrified brick paving, 2 courses, and concrete curbing in S. Main st. Cy. clk.

Rhinelander, Wis.—Sealed bids are asked until April 12 for paving with macadam with combined cement curb and gutter, a number of streets. Geo. C. Jewell, chm. B. P. W.

Duluth, Minn.—Bids are asked until April 20 for paving Jefferson st. from 13th to 22d aves. with asphalt, tar macadam, or creosoted block. Thos. F. McGilvary, cy. engr.

Irvington, N. J.—Bids are asked until 8 p. m. April 2 for grading and flagging Mt. Vernon ave. and grading, flagging, curbing and guttering Rodwell ave. M. Stockman, town clk.

Bridgeton, N. J.—Sealed bids are asked until April 19 for furnishing 50,000 vitrified shale brick or vitrified shale paving block. Wm. C. Marks, chm. com. on sts. and sidewalks.

New Brunswick, N. J.—Sealed bids are asked until April 4 for furnishing and delivering 1½ and ¾-in. trap rock stone and coarse screenings. F. H. Pownall, dir. freeholders.

Davenport, Ia.—Sealed bids are asked until 2 p. m. April 2 for paving Ruholine and Marquette sts. and Denison ave. with asphalt, and Grand ave. and an alley with brick. Thos. Murray, cy. engr.

Jeffersonville, Ind.—Bids are asked until May 4 for grading, draining and paving with crushed stone or other material several roads. John Scheller, chm. co. com.; George B. Parsk, co. audt.

Binghamton, N. Y.—Bids are asked until April 8 for repaving Main and Chenango sts. and Court and Ferry st. bridges with vitrified brick or wood block on concrete base. D. C. Henick, cy. clk.

Vincennes, Ind.—Sealed bids are asked until 1 p. m. April 1 for constructing gravel roads in Vincennes twp. and until April 5 for constructing gravel roads in Vincennes and Palmyra twps. John T. Scott, co. audt.

Cincinnati, O.—Bids are asked until April 4 for paving McMultan st. with wood block with granite curb and Broadway with granite blocks. Bids are asked until April 8 for paving Hawthorne ave. and Watson Place with brick. M. J. Keefe, clk. B. P. S.

Columbus, O.—Sealed bids are asked until April 3 for constructing a State highways. Contracts for State highways will also be let at the following places: Ravenna, April 16; Jefferson, April 17; Hillsboro, April 19. Sam Huston, comr. State Highway Dept.

Summit, N. J.—Sealed bids are asked until 8:30 p. m. April 2 for constructing 2,100 sq. ft. of cement sidewalk; relaying 826 sq. ft. old flagging, 650 ft. 18 and 4-in. new blue stone curb; 25 ft. cement curb; 55 ft. old curb reset. J. Edw. Rowe, cy. clk.; Wm. S. Logan, cy. engr.

Chattanooga, Tenn.—Bids are asked until 2:30 p. m. April 2 for paving Rossville ave. with brick, for resurfacing Market and Walnut sts. with asphalt and constructing pipe sewer on Camera Hill. H. F. Van Dusen, chm. B. P. W.

Grand Rapids, Mich.—Bids are asked until April 5 for paving La Grade st. with brick. Jas. E. Keegan, pres. B. P. W.

Savannah, Ga.—Bids are asked until April 10 for removing present asphalt paving and placing 2-in. asphalt wearing surface on 34,430 sq. yds. of Liberty st. and 17,950 sq. yds. of Brighton st., and resurfacing other streets. Harry Willink, dir, pub. wks.

CONTRACTS AWARDED.

Salina, Kan.—The contract for paving was awarded to Ritchie & Ramsey.

Dayton, O.—Fauber & Lennick secured the contracts for alley paving March 20.

Lansing, Mich.—Farrell Bros. secured the contract for paving Franklin ave. for $9,875.

Cincinnati, O.—The contract for improving Coleram ave. was awarded to A. J. Henkel for $57,623.75.

Wauseon, O.—Heffner & Son of Celina, O., secured the contract for paving Fuller st. in this city for $12,200.

Elkhart, Ind.—The contract for paving Harrison st. was awarded to W. Worth Bean of Benton Harbor, Mich.

Springfield, O.—W. F. Payne was awarded the contract for paving Monroe st. with gravel for $8,040.11.

Wheeling, W. Va.—John Cochen was awarded the contract for laying 10,000 ft. of curbing at 17 cents a foot.

Little Rock, Ark.—The contract for macadam paving on Maple and Washington aves. was awarded to the Argenta Paving Co.

Marion, Ind.—O. J. Simmons was awarded the contract March 19 for paving 11 blocks of 7th st. with brick for about $20,000.

Lima, O.—F. A. Freshwater & Son of Chester, W. Va., was awarded the contract March 15 for paving S. Pine st. with brick.

Tacoma, Wash.—The contract for asphalt paving in District No. 329 was awarded to the Independent Asphalt Paving Co. for $76,987.

Regina, Man.—The contract for bitulithic paving was awarded to the Bitulithic & Contracting Co., of this city, for $125,000.

Tacoma, Wash.—The contract for paving S. 9th, 11th and 13th sts. with sandstone blocks was awarded to George Milton Savage.

Corning, N. Y.—The McGrevey Construction Co., of Ithaca, was awarded the contract for paving here for $43,704.25.

Tulsa, I. T.—The contract for 23 blocks of asphalt paving was awarded to the Cleveland Trinidad Asphalt Co. for $127,000 March 11.

Little Rock, Ark.—The Memphis Asphalt & Paving Co. was awarded the contract for paving W. 9th st. with asphalt at $1.96 a sq. yd.

Cleveland, O.—Balwin Brothers & Graham secured the contract March 20 for paving 5 mis. of North Ridge road with brick for $110,171.

Milwaukee, Wis.—The Badger Construction Co. was awarded the contract for creosoted wood block paving on concrete base on Wells st. at $3.05 a sq. yd.

Rochester, N. Y.—F. C. Lauer & Sons Co. was awarded contracts for brick paving, March 7, as follows: Seibert Place, $4,177; Wildman st., $5,442.50.

Monessen, Pa.—The contract for paving Oneida and Shoemaker sts. and McKee ave. with asphalt blocks was awarded to Borman Bros. of McKeesport for $24,014.

Boylestown, Pa.—The contract for paving ½ mile of streets between the tracks of the Reading Traction Co. was awarded to Willauer & Co. of Pottstown.

New Orleans, La.—The contract for 70,210 sq. yds. of bitulithic paving was awarded to the Southern Bitulithic Co. of Nashville, Tenn., at $2.70 a sq. yd. or $200,000.

Norwood, O.—J. M. McJoyot was awarded the contract March 11 for improving Hazel ave. for $6,760.80 and John Snyder the contract for improving Kenilworth ave. for $13,090.

Bernardsville, N. J.—The contract for constructing a macadam road from Claremont road to Oak stump, 1 mile, was awarded March 17 to Dickerson & Gill of Dover for $10,730.50.

Wichita, Kan.—The contract for paving Lawrence ave. with asphalt was awarded March 18 to the Cleveland Trinidad Paving Co. at $2.14 a sq. yd.; grading, 43 cts. a cu. yd.; residue gutter, 34 cts. a lin. ft.

Washington, D. C.—The contract for furnishing sand and gravel to the District of Columbia the next fiscal year was awarded March 9 to the Potomac Dredging Co., at 65 cts. a cu. yd. for sand and 85 cts. for gravel.

Des Moines, Ia.—The contract for building all sidewalks in this city during 1907 was awarded to Marion Hearshman as follows: Brick walk, 89 cts. a sq. ft.; brick driveway, 18 cts.; cement walk, 9 cts.; cement driveway, 15 cts.; grading, 50 cts. a cu. yd.

Peoria, Ill.—J. S. Allen was awarded contracts for paving Nebraska ave. with brick for $9,755.02, and Daylas st. with brick for $8,922.41.

Goshen, Ind.—The contract for paving Purl st. with Metropolitan block was awarded March 4 to W. W. Natch & Sons of this city. The work involves 11,580 sq. yds. of paving, 6,000 lin. ft. combination curb and gutter, 4,400 cu. yds. excavation and 29 catch basins.

Davenport, Ia.—Paving contracts were awarded March 6 as follows: Pine, Ainsworth, Locust and Gaines sts. and Jersey Ridge road, McCarthy Improvement Co.; Bowditch, Davie and 7th sts., Davenport Construction Co.; Clay, South and Leonard sts., Hydraulic Construction Co.

Dallas, Tex.—The contract for paving the main drive at the Fair Grounds was awarded to the Texas Bitulithic Paving Co. as follows: Macadam paving, 66 cts. a sq. yd.; No. 3 cement curbing, 55 cts. a lin. ft.; 12-in. wood curbing, 13½ cts., and 10-in. wood curbing, 10 cts. a lin. ft.

Dayton, O.—Paving contracts have been awarded as follows: Emmett st., $4,194.30, and an alley, $1,278.90; Carlyle block, A. Wroe & Sons; alley, Athens block, $1,517, Cain Construction Co.; alley, $1,080, Geo. P. Hively; Harry st., $1,252.80, and College st., $958.75, Munger & Kaylor.

Salt Lake City, Utah.—Contracts were awarded March 16 as follows: Constructing cement sidewalks during 1907, S. Birch, city, $92,453; cement sidewalk extension No. 108, Johnson & Beacom, Missoula, Mont., $262,036; repairing paved streets, E. J. Maran, city, $11,155; stone block crosswalks, Custer & Burst, city, $3,640.

Niagara Falls, N. Y.—Bids were submitted March 21 for paving Willow st. from Main st. to the Erie Railroad tract, as follows: Interstate Paving Co., Hassam pavement, $2.20 a sq. yd. or $4,009.70; H. P. Burgard, California asphalt, $2.40 a sq. yd. or $4,259.90.

Chicago, Ill.—The Barber Asphalt Co. was awarded a contract for paving Union ave. from 41st st. to Garfield boulevard with asphalt for $93,351.50. The Starr Concrete Sidewalk Co. was awarded the contract for constructing a concrete promenade 8 ft. wide along Humboldt Park, Sacramento and Hedzil aves., at 15⅞ cts. a sq. ft. or $8,400.

Mishawaka, Ind.—The lowest bids submitted for paving Main, North Church and First sts. with Nelsonville block were those of Rankerd & Eggleston at $1.38, $1.35 and $1.36 respectively; for Bridge st., C. H. Defrees, of South Bend, at $1.35; S. Main and S. Church sts., asphalt, Western Construction Co., Indianapolis, at $1.68 a sq. yd.

Duluth, Minn.—E. A. Dahl was awarded the contract March 15 for paving 3d st. with brick, at 93 cts. a sq. yd. for grading, 30 cts. for headers, 56 cts. a lin. ft. for curbing, $2.46 for cement filler, $2.61 for asphalt filler; total, $42,000. Fielding & Shepley secured the contract for paving 8th st. with brick at 75 cts. for grading, 65 cts. for curbing, $2.41 for cement filler, $2.56 for asphalt filler; total, $10,000.

Indianapolis, Ind.—Under the new specifications recently adopted the bid submitted March 19 for the repair of asphalt streets by the Western Construction Co. was the lowest bid ever submitted. The Western Construction Co. specified Bermudez Pitch Lake asphalt and agreed to do all repair work covered by the specifications for 66 cts. a sq. yd. The Marion County Construction Company, the successful bidder last year, submitted the next lowest set of bids, bidding 70 cents for work with El Oso asphalt, 71 cents

with California asphalt, and 72 cents with Trinidad Pitch Lake asphalt. The Hoosier Construction Company, specifying California asphalt, bid $1.21, and the Barber Asphalt Construction Company, without specifying any particular kind of material, bid $1.13.

Washington, D. C.—The Brennan Construction Co. of this city was awarded the contract March 23 for repairing and resurfacing asphalt pavements in the city for four years. The specifications consisted of five classes, each class of which was divided into two more classes, and the bids were as follows: (1) Standard asphalt pavement, 2½-in. asphalt surface, 2-in. binder before compression with 6-in. base, Brennan Construction Co., "A," $1.63 and "B" $1.50; Barber Asphalt Paving Co., $1.79 and $1.78; Cranford Paving Co., $1.77 and $1.79. (2), same as (1) except that it provides for 6-in. concrete base, type "B," according to class "A" and "B," Brennan, $1.69 and $1.63; Barber, $1.89 and $1.80; Cranford, $1.89 and $1.91. (3) Standard asphalt surface, 2½-in. before compression, according to classes, Brennan, 67 and 60 cts.; Barber, 84 and 83 cts.; Cranford, 73 and 77 cts. (4) Standard asphalt surface measured by cart, according to classes, Brennan, 49 and 44 cts.; Barber, 58½ and 58 cts.; Cranford, 52 and 55 cts. by cart. Standard asphalt binder measured by cart, Brennan, 28 and 25 cts.; Barber, 30 and 29½ cts.; Cranford, 28 and 29½ cts.

SEWERS.

CONTEMPLATED WORK.

Ennis, Tex.—A sewerage system is contemplated.

Fairfield, Cal.—A main sewer is contemplated.

Holly, Colo.—A sewerage system is contemplated.

Medina, O.—Voted to establish a sewerage system.

Hegewisch, Ill.—Bids will be asked soon for a sewerage system.

Shelby, Mo.—Voted to issue bonds for constructing a sewerage system.

Ponca City, Okla.—Will vote on the issue of bonds for a sewerage system.

St. Marys, Pa.—Voted to issue bonds for constructing a sewerage system.

Mt. Sterling, Ky.—Will vote on the issue of bonds for a sewerage system.

Dundee, Ill.—West Dundee will vote April 16 on the proper sewerage system.

Chagrin Falls, O.—Voted to issue bonds for constructing a sewage disposal plant.

Galena, Mo.—Plans and specifications for a sewerage system have been completed.

Eaton, O.—Plans for a sewerage system have been prepared by A. L. Reid, cy. engr.

Davenport, Ia.—City council has authorized the construction of 2 big storm sewers.

Elyria, O.—A resolution has been passed to construct a trunk sewer in W. 8th st.

Janesville, Wis.—Plans have been adopted for constructing sewers. Mayor Hutchison.

Lawton, Okla.—Voted to issue bonds for extending the sewerage on waterworks system.

Bozeman, Mont.—Plans for 3-13 miles of sewers have been prepared by C. M. Thorpe, cy. engr.

Madison, Ga.—Plans for a sewerage and waterworks system will be made by E. H. Davis, of Griffin, Ga.

Salem, Mass.—This city will build sewers in South Salem this spring at a cost of about $100,000.

Evart, Mich.—Plans for a sewerage system have been prepared by the Riggs-Sherman Co. of Toledo, O.

Morristown, N. J.—Will vote on the construction of sewers, septic tanks, contact beds, etc.

Hot Springs, Ark.—Bids will be asked soon for constructing a sewer in District No. 24. G. M. French, cy. engr.

Covington, La.—This city will engage an engineer to make a survey for sewerage and waterworks systems.

Howell, Mich.—Plans for a sewerage system have been completed by Riggs-Sherman Co. of Toledo, O.

Niles, O.—Special.—William Wilson, C. E., has been engaged to design a sewage disposal system for this city.

Girard, O.—Will vote April 16 on the issue of bonds for building a main sewer and sewage disposal plant.

Latonia, Ky.—Council passed an ordinance March 12 for constructing a sewer on Conger st. from Pike to Church.

Richmond, Ind.—A resolution was passed March 20 to build a sewer system in West Richmond, and bids will be asked at once.

Seattle, Wash.—Plans and specifica- have been adopted for constructing a sewer to drain about 20 sq. mis. of this city.

Fayetteville, Ark.—Plans for a sewerage system, including 2 septic tanks, have been prepared. B. F. Campbell, sec. bd. impvts.

Ritzville, Wash.—Mayor Holcomb has been directed to communicate with Prof. Waller of the State College at Pullman regarding the cost of a septic tank sewer system.

Laurel, Md.—The Laurel Improvement Association has passed a resolution asking the mayor and city council to bond this town for $50,000 to build a new sewerage and electric light system.

Red Deer, Alberta.—Special.—Sealed bids are asked until April 15 for the purchase of sewer, waterworks extension, hospital grant, fire hall, local improvement bonds. L. C. Fulmer, sec. and treas.

Wichita, Kan.—Special.—A sanitary sewer district has been laid out in the West Side of Wichita, covering about 20 miles of sanitary sewers. Ransom Brown, cy. engr.; Burns & McDonnell, cons. engrs., Kansas City, Mo.

Pierre, S. D.—Special.—Edward K. Mather, cy. engr., says complete plans and specifications have been prepared for a new sewerage system of 8 to 28-in. cement or vitrified pipe and 4 and 6-ft. concrete storm sewer. Bids will be asked soon.

Abbeville, La.—Special.—H. P. Porter, cy. engr., says work will begin soon on sewerage for this town and he desires quotations on sewer pipe as follows: 72 lengths 30 in. each by 12 in. inside diameter with bell one end; 14 lengths 30-in. by 10-in.; 218 lengths 20-in. by 30-in.; 2 castings and gratings for surface catch basins.

CONTRACTS TO BE LET.

Crowly, Ia.—Sealed bids are asked until April 2 for constructing a sewer system. Shelby Taylor, mayor.

Hobart, Okla.—Bids are asked until April 20 for a storm sewer of brick, pipe and concrete. O. E. Noble, cy. engr.

Fond du Lac, Wis.—Bids are asked until April 6 for constructing storm sewers. L. A. Pettibone, cy. engr.

Washington, D. C.—Sealed bids are asked until April 12 for constructing sewers. H. B. F. MacFarland, chm. dist. com.

Battleford, Sask.—Sealed bids are asked until April 15 for constructing a sewer system. R. C. Lawrie, sec.-treas.

Camden, S. C.—Sealed bids are asked until May 1 for constructing a sewerage system. H. C. Carrison, chm. sewerage com.

Waverly, Ia.—Sealed bids are asked until 3 p. m. April 2 for building an 8-in. sanitary sewer. F. H. Munger, cy clk.

Parkersburg, W. Va.—Sealed bids are asked until April 1 for constructing a brick storm sewer. Frank Good, cy. audt.

Emmetsburg, Ia.—Bids are asked until April 4 for constructing drainage district No. 14. Sim. R. Stedman, co. audt.

Davenport, Ia.—Sealed bids are asked until 2 p. m. April 2 for building sewers on certain streets. Thos. Murray, cy. engr.

Winnetka, Ill.—Bids are asked until April 9 for constructing a system of storm water sewers. Edw. C. Kobler, pres. bd. local impvts.

Estherville, Ia.—Bids are asked until April 2 and 3 for constructing tile ditches No. 33 and an open ditch. Roy J. Ridley, co. audt.

Ithaca, N. Y.—Sealed bids are asked until April 4 for constructing reinforced concrete septic tanks. H. L. Stewart, supt. sewer com.

Baltimore, Md.—Sealed bids are asked until April 10 for building outfall sewers, interceptors, etc. Peter Leary, Jr., chm. sewerage com.

Oshkosh, Wis.—Bids are asked until April 8 for constructing a sewer, with catch basin, manholes, etc. W. A. Marden, chm. B. P. W.

Chattanooga, Tenn.—Sealed bids are asked until 2:30 p. m. April 2 for constructing certain pipe sewers. H. F. Van Dusen, chm. B. P. W.

Waverly, Ia.—Sealed bids are asked until 5 p. m. April 2 for constructing an 8-in. sanitary sewer in W. Water st. F. H. Menger, cy. clk.

Shelbyville, Ky.—Bids are asked until April 2 for constructing a sewerage system, septic tank, 62 manholes, 14 lampholes, etc. C. W. Ballard, sec. sewer com.

Summit, N. J.—Sealed bids are asked until 8:30 p. m. April 2 for constructing storm water sewers in High st. and Kent Place boulevard. J. E. Rowe, cy. clk.

Troy, Ala.—Sealed bids are asked until April 16 for laying 7,000 ft. of 8- to 10-in. sanitary sewers, with manholes, flushtanks, etc. John Gamber, cy. clk and treas.

Saratoga Springs, N. Y.—Sealed bids are asked until 2 p. m. April 2 for building a 6-in. terra cotta sewer in Henry st. Philip S. Wakely, clk. sewer, water and st. com.

Des Moines, Ia.—Bids are asked until April 5 for constructing the Grand View sewer system, requiring 10,449 lin. ft. 10, 12, 15, 18 and 20-in. vitrified pipe sewers. W. W. Wise, chm. B. P. W.

Boston, Mass.—Sealed bids are asked until April 5 for constructing in earth tunnel part of section 83 of the extension of the high-level sewer, South Metropolitan systems in Winchester st., Brookline. Henry H. Sprague, chm. Met. sewerage and water board.

Waterbury, Conn.—Sealed bids are asked until 8 p. m. April 2 for constructing section 3, main carrier, sewage disposal works, including filter influent and effluent conduits, grit chamber, substructure for controller house and appurtenances. R. A. Cairns, cy. engr.

Ottawa, Ill.—Bids are asked until April 2 for building a sewer in Guthrie st. Chas. E. Hooks, pres. bd. local impvts.

Newark, N. J.—Bids are asked until April 4 for building section 2 of the Peddie st. and Badger ave. relief sewer. Wm. E. Greathead.

Portsmouth, O.—Sealed bids are asked until April 13 for constructing sewers in flood defense district No. 2. Chas. F. Schurman, clk. B. P. S.

Spokane, Wash.—Sealed bids are asked until April 11 for constructing a trunk sewer in First ward sewer district No. 4. J. T. O'Brien, sec. B. P. W.

CONTRACTS AWARDED.

Litchfield, Ill.—John Harrison submitted the lowest bid March 6 for constructing a new sewer for $76,750.

Ravenna, O.—The contract for constructing a sewerage system was awarded to E. McShaffrey & Son for $58,700.

Augusta, Ga.—The contract for constructing sewers during 1907 was awarded to Theo. G. McAuliffe for $6,857.50.

Trenton, N. J.—Ross & Boscovelli secured the contract March 5 for constructing sewers in Ferrier and Girard aves.

Massillon, O.—Schott & Kraft secured the contract March 20 for constructing sewers in Cedar st. and Woodland ave.

Sayre, Pa.—The contract for building a trunk sewer was awarded March 12 to John J. Higgins of Waverly, N. Y., for $19,313.

Decatur, Ill.—The contract for constructing the East Prairie district sewer was awarded to S. A. Tuttle & Co. for $41,370.

Newark, N. J.—The contract for constructing section 2 of the East Branch sewer was awarded to Jas. J. Fusco Mar. 14 for $22,264.60.

Cairo, Ill.—The contract for constructing main concrete sewers was awarded to the Ricte Construction Co. March 15 for $108,813.10.

Norwood, O.—The contract for constructing a brick sewer which was awarded several months ago to Castoe & Warner, has been sublet to Thomas Bridges & Son.

Salt Lake City, Utah.—Special.—Louis C. Kelsey, cy. engr., advises us that the contract for constructing pipe sewers during 1907 was awarded March 16 to Jas. Kennedy of this city for $282,728.

Des Moines, Ia.—The contract for constructing the second section of the Grand View sewer was awarded to James Smith at $1.98 a lin. ft. and for building a sewer in E. 5th st. to John A. James at $1.70 a lin. ft.

Knoxville, Tenn.—Bids were submitted March 22 for sewer work in 23 districts by six contractors—Chas. T. Heins, Jos. Hannigan, Chas. Kerwin, J. A. Ahler Plumbing Co., Arthur Wardrep and O. L. Cheely—but the award of the contract was deferred.

Fairbury, Neb.—Special.—W. W. Watson, cy. engr., says the contract for lateral sewers in districts No. 4, 5 and 8 was awarded to T. W. Roberts of Independence, Mo., for 57 cents per foot for 8-in. sewers; 50 cents per foot for manholes, and $75 for flush tanks.

Polo, Ill.—Special.—J. A. Davison, cy. engr., says bids were opened March 21 for constructing sewers and the contracts awarded on following sewers in District No. 1: Stoltz & Gass, Belleville, Ill., $26,400; outlet sewer and purification plant, Dailey & Brown of Jacksonville, Ill., $10,775.24.

Allegheny, Pa.—Sewer contracts were awarded March 5 as follows: Marshall ave., $5,000; Home st., $1,000; Margaret st., $392.60, Thos. Cronon & Co. McIntyre ave., $3,000; Gittens st., $2,026; Wm. C. Fishburn & Co. Lecky alley, $500;

Boquet st., $792; Maguin ave., $2,155; M. O'Herron & Co. McCook st., $586; Victor st., $1,294.50, Ott Bros.

Ottumwa, Ia.—Special.—C. R. Allen, cy. engr., advises us that contracts were awarded to John W. Scott of Ottumwa March 11 as follows: Constructing West End trunk sewer system reinforced concrete sewer, pile foundation, 8-ft., $23.90 a ft.; 8-ft., $12.26; 8-ft. brick, $6.50; 6-ft. brick, $6; 5-ft. brick, $6; 5-ft. block, $5.75; 4½-ft. brick, $5; 4½-ft. block, $4.75; 36-in. clay pipe, $6.50. Constructing Blake's branch trunk sewer, 8-ft. brick and stone, $13.60 a lin. ft.

WATER WORKS.

CONTEMPLATED WORK.

Bangor, Me.—The water mains will be extended.

New Albany, Ind.—A filtration system is proposed.

Tucson, Ariz.—Voted to issue bonds for waterworks improvements.

Cheney, Wash.—The improvement of the waterworks system is contemplated.

Cumberland, Wis.—The improvement of the water and light plant is contemplated.

El Dorado, Kan.—The question of improving the water supply is being agitated.

Portland, Ore.—Will vote in June on the issue of bonds for laying new water mains.

Canton, Miss.—Contracts will be let soon for a pumping engine and drilling a well.

Gunnison, Colo.—This town will improve and enlarge its waterworks and light plant.

Madison, Ga.—Plans for new waterworks and sewerage systems will be prepared by E. H. Davis.

Covington, La.—An engineer will be engaged to survey this town for a waterworks and surface drainage system.

Bristol, Tenn.—A resolution has been adopted to purchase the waterworks system of the Bristol Goodson Water Co. for $151,000.

Atlanta, Ga.—Will vote April 9 on the issue of $500,000 bonds for improvements and additions to the waterworks system.

Zanesville, O.—Will probably vote on the question of improving the city water supply by constructing a filtration system.

Allegheny, Pa.—Council passed March 21 the $1,000,000 bond issue for building a new reservoir and improving the water supply.

Lewiston, Idaho.—Will vote on the issue of bonds for improving the waterworks system by a new pump, etc., and water meters.

La Grande, Ore.—Voted to issue $160,000 additional water bonds to bring the waters of Beaver Creek to this city for domestic use.

San Diego, Cal.—Voted to issue $795,000 bonds for municipal improvements, including waterworks, sewerage and paving improvement.

Preston, Idaho.—The town board is considering the question of constructing a waterworks system, fire protection and drainage for this town.

Council Bluffs, Ia.—City council voted against municipal ownership of the waterworks plant March 4 and granted a franchise to the water company.

Citronville, Ala.—This city has retained Edgar B. Kay of the University of Alabama to prepare plans and superintend the construction of a combined waterworks and electric light plant here.

The question of issuing bonds for constructing waterworks systems will be voted on as follows: Larimore, N. D.; Haddonfield, N. J., April 9; Lewisburg, Tenn.; Middleton, Wis.; Herington, Kan., April 2; Ponca City, Okla.; Breda, Ia.

The question of issuing waterworks bonds has been favorably voted on at the following places: Shelby, N. C.; Carthage, Mo.; Simcoe, Ont.; Snyder, Okla.; Papillion, Neb.; Centralia, Mo.; Medina, O.; De Funiak Springs, Fla.; Vernon Center, Minn.

Grand Rapids, Mich.—Special.—This city will vote on the issue of $1,000,000 for flood protection and $1,500,000 for a pure water supply; one proposition providing for mechanical filtration and one for a water supply from Lake Michigan.

The construction of waterworks systems is contemplated at the following places; Browersville, Minn.; Sauk Rapids, Minn.; Commerce, Ga.; Danforth, Ill., Henderson, Minn.; Manitowoc, Wis.; Robbinsdale Park, Minn.; Good Hope, Ill.; Heyworth, Ill.; Bellaire, Mich.; Battle Lake, Minn.; Johnson City, Tenn.; Slippery Rock, Pa.; Virginia, Ill.; Wrightsville, Ga.; Bertrand, Neb.; Towner, N. D.

CONTRACTS TO BE LET.

Canton, Ill.—Bids are asked until 7 p. m. April 2 for drilling a deep well. Jos. Waugh, cy. clk.

Bruce, Wis.—Bids are asked until April 10 for constructing waterworks. Wm. Blackburn, cy. clk.

Austin, Pa.—Bids are asked until April 4 for constructing a waterworks system. F. N. Hamlin, pres. bd. coun.

Billings, Mont.—Bids are asked until April 10 for constructing municipal waterworks. Henry Gerharz, cy engr.

Austin, Pa.—Bids are asked until 8 p. m. April 4 for constructing a waterworks system. F. N. Hamlin, pres. coun.

Guntersville, Ala.—Bids are asked until 4 p. m. April 2 for constructing a waterworks system. D. Isbell, mayor.

New London, Conn.—Bids are asked until April 15 for carting and laying water pipe and specials. W. H. Richards, engr.

Crowley, La.—Sealed bids are asked until 6 p. m. April 2 for 20,000 ft. of 6-in. water mains extension. Shelby Taylor, mayor.

Bradford, Pa.—Bids are asked until April 20 for constructing a reservoir on hill north of Center st. A. F. Bannon, Jr., cy. engr.

Klamath Falls, Ore.—Bids are asked until April 15 for constructing Keno Canal, Klamath Project, Ore.-Cal. U. S. Reclamation Service.

Waterbury, Conn.—Sealed bids are asked until 8 p. m. April 2 for rebuilding the retaining wall along Baldwin st. R. A. Cairns, cy. engr.

Wheatland, Wyo.—Bids are asked until April 10 for extending No. 1 canal of the Wyoming Development Co. here. Joseph C. Hadsall, engr., Wheatland.

Astoria, Ore.—Bids are asked until May 2 for constructing a main ditch and laterals. John N. Metzger, chm, commis. Wild Cat Drainage Dist.

Indianapolis, Ind.—Bids are asked until April 5 for new boilers, pumps, heater and pipe work for the Marion County power house. John E. McGaughey, chm. co. com.

Atlanta, Ga.—Sealed bids are asked until April 10 for furnishing 39,450 ft. 36, 12, 10 and 8-in. c. i. pipe and fittings. Park Woodward, gen'l mgr. water com.

Battleford, Sask.—Sealed bids are asked until April 15 for constructing a waterworks force main, distributing system and intake tank, pump, boiler, etc. R. C. Laurit, sec.-treas.

Great Falls, Mont.—Bids are asked 2 p. m. April 3 for constructing 12 miles of main canal, 67 miles of laterals and 17 miles of waste water ditches near here. U. S. Reclamation Service.

Ft. Bliss, Tex.—Bids are asked until June 3 for sinking a deep well, installing a deep well pump, constructing pump shelter and trestle, steel tank and installing 2 boilers. Constr. Q. M.

Belle Fourche, S. D.—Bids are asked until April 10 for constructing section 2 to 8 of South Canal with appurtenant structures. Belle Fourche Project, S. D. U. S. Reclamation Service.

Crawford, Neb.—Bids are asked until June 5 for constructing Pathfinder dike, about 45 miles southwest of Casper, Wyo. U. S. Reclamation Service, Washington, D. C., Crawford, Neb., and Casper, Wyo.

Yonkers, N. Y.—Bids are asked until 8 p. m. April 4 for constructing a water filtration plant, consisting of 2 covered masonry sand filters and appurtenances. A. W. Kingsbury, clk. bd. water com.

Atlanta, Ga.—Sealed bids are asked until 4 p. m. April 10 for constructing a coagulating basin and 1 clear water basin at waterworks pumping station No. 2. Park Woodward, gen'l mgr. bd. water com.

Cincinnati, O.—Sealed bids are asked until April 16 for laying c. i. pipe and special castings and valves on certain streets and extending and improving the distribution system. Aug. Herrmann, pres. bd. trustees, W. W. Com.

Huntley, Mont.—Bids are asked until April 17 for constructing structure on Garland Lake and laterals near Ralston, Shoshone, Shoshone Project, Wyo., involving about 47,000 cu. yds. grading, 5,000 cu. yds. concrete, placing 348,000 pounds of steel resurfacing bars, etc. Supervising engr., Huntley.

McKeesport, Pa.—Sealed bids are asked until April 16 for laying 8, 12, 20, 24 and 30-in. mains, including a new intake line; a mechanical filtration plant and building a water softening plant and building; a chemical storage building; 1 boiler; 2 7,000,000-gal. low lift. centrifugal pumping engines; 5 smaller pumps and 2 water meters. Geo. B. Hermick, chm. bd. water and light com.

CONTRACTS AWARDED.

Maypearl, Tex.—The contract for constructing a waterworks system was awarded to P. Gilmore.

San Angelo, Tex.—A 50-year franchise was granted the San Angelo Waterworks Co. March 19.

Hastings, Minn.—The contract for constructing waterworks and sewers was awarded to Wm. Tunny of Joliet, Ill., for $33,694.

Corning, N. Y.—The contract for constructing 3 large reinforced concrete reservoirs was awarded March 19 to Bradley & Nolan, of Reading, Pa., and Corning.

Toledo, O.—The contract for an addition 800-h. p. boiler at the waterworks pumping station was awarded to the Toledo Boiler Works Co. for $13,863.

Milwaukee, Wis.—The contract for furnishing pipe for water mains during 1907 was awarded to the U. S. Cast Iron Pipe & Foundry Co. at $37 a ton for 8, 12 and 16-in. pipe.

La Crosse, Wis.—Contracts were awarded March 14 as follows: Furnishing pipe and valve boxes, W. A. Roosevelt Co., $8,747.62 and $419.88 respectively; hydrants, R. D. Wood & Co. of Philadelphia, $876.75.

Schenectady, N. Y.—The contract for laying 45,938 lin. ft. of c. i. water mains was awarded to Joseph Clements & Son, at 32 cts. a ft. for 8-in., 30 cts. for 6-in., 28 cts. for 4-in., and $2.40 a cu. yd. for excavation.

Seattle, Wash.—Ide & Sons, 918 12th ave. secured the contract for Great Lake reservoir for $77,455 and Green Lake low service reservoir for $61,185. Hawley & Lane secured the contract for Beacon Hill reservoir for $202,450.

Salt Lake City, Utah.—Special.—Louis C. Kelsey, cy. engr., advises us that the contracts for the construction of water mains during 1907 was awarded to J. W. Perveival of this city for $119,592.50; constructing new c. i. water supply mains, P. J. Moran of this city for $231,343.04; continuous wooden stave pipe, D. J. Moran, $145,991.24.

BRIDGES.

Byron, O.—Bids are asked until April 6 for constructing several bridges. Co. audt.

Waco, Tex.—Will vote on the issue of $20,000 bonds for permanent bridges.

Mitchell, S. D.—Bids are asked until April 5 for building three steel bridges. A. B. Anderson, co. audt.

Fort Dodge, Ia.—Bids are asked until April 5 for constructing an iron bridge. D. S. Foughman, mem. com.

Napoleon, O.—Bids are asked until April 4 for constructing seventeen concrete bridges. J. F. Beck, co. audt.

Brooklyn, N. Y.—Another new bridge, between the present Brooklyn bridge and the new Manhattan bridge, is proposed.

Cincinnati, O.—An ordinance was passed March 11 authorizing the issue of $540,000 bonds to build the Gilbert ave. viaduct.

Jacksonville, Fla.—Plans for viaduct to be constructed on Adams st. have been prepared by Phillip Prileau, cy. engr.

La Grange, Ind.—Bids are asked until April 2 for constructing and erecting a number of bridges. W. B. Weaver, co. audt.

Wichita, Kan.—Will vote April 2 on the issue of bonds for building a new bridge across the Arkansas River on Douglas ave.

Indianapolis, Ind.—Sealed bids are asked until April 5 for constructing bridges and culverts. Jno. E. McGaughey, chm. com.

Covington, Ind.—Bids are asked until April 2 for constructing several bridges. Wm. B. La Baw, co. surv., Veedersburg.

San Bernardino, Cal.—Bids are asked until April 8 for constructing a bridge over Plunge Creek, Orange st. Chas. Post, co. clk.

Duluth, Minn.—Bids are asked until April 19 for building a steel bridge over St. Louis river at Aurora Road. O. Halden, co. audt.

Knoxville, Tenn.—The citizens in the 9th and 10th wards want the old steel bridge at Asylum ave. removed and a concrete structure erected.

Cleveland, O.—Sealed bids are asked until April 6 for constructing concrete abutments and bridge work in Bedford twp. Julius C. Dorn, co. clk.

Shelley, Idaho.—Bids are asked until April 8 for constructing a wagon bridge across Snake river about 2 miles north of this town. H. B. Curtis, co. clk.

New York City.—Bids are asked until April 11 for constructing the first section of the Subway loops between the bridges. Rapid Transit Com.

Clinton, Me.—Surveys and estimates been eprpared for 500-foot bride across the Kenebec between this city and Fairfield, at Pishons Ferry.

Wabash, Ind.—Bids are asked until

April 2 for constructing 35 concrete arch bridges, concrete abutments and other bridges. W. S. Davis, co. audt.

Grandville, O.—Bids are asked until April 11 for constructing a concrete steel arch bridge across Pamp Creek about 3 miles south of this city. H. L. Maddocks, co. engr.

Denver, Colo.—Sealed bids are asked until April 15 for constructing a reinforced concrete highway bridge with iron hand rail, across Cherry Creek at Bannock st. G. A. Randolph, pres. B. P. W.

Hoboken, N. J.—Bids are asked until April 4 for building a viaduct in two sections to connect with 14th st., Hoboken, and roads in connection therewith. Walter O'Mara, clk. freeholders, Jersey City.

South Bend, Ind.—Bids are asked until April 8 for putting in new concrete substructures and re-erecting 2 old iron bridges and erecting a new Melan arch bridge. John W. Harbon, co. audt.

STREET LIGHTING.

Gunnison, Miss.—An electric light plant is proposed.

Lohrville, Ia.—Voted to issue bonds for constructing gas plant. Hugh Baird, cy. clk.

Centralia, Mo.—Voted to issue bonds for constructing municipal lighting and water plant.

Harrington, Kan.—Will vote April 2 on the issue of bonds for municipal lighting and water plant.

Natchez, Miss.—Bids are asked until May 1 for lighting this city for ten years. Geo. T. Eisele, cy. clk.

Ft. Erie, Ont.—Bids are asked on April 5 for installing electric light plant here. B. F. Matthews, town clk.

Topeka, Kan.—Will vote April 2 on the issue of bonds for the reconstruction of the city electric light plant.

Freemount, Neb.—Bids are asked until April 3 for constructing electric light plant. E. N. Morris, chm. B. P. W.

Battleford, Sask.—Bids are asked until April 15 for installing electric light plant. R. C. Laurie, sec. and treas.

Upper Sandusky, O.—Harry Dye of Galion has been engaged to prepare plans and specifications for municipal lighting plant.

Laurel, Md.—The Laurel Improvement Association has asked the town to appropriate $50,000 for a new electric light plant and sewerage system.

Holly, Colo.—The Holly Sugar Co. is considering the construction of an electric light plant here if council will grant a franchise.

St. Augustine, Fla.—City council has authorized the finance committee to investigate the cost of installing electric light plant in this city.

Colorado Springs, Colo.—Will vote on the question of issuing bonds for the purchase or construction of the municipal electric lighting plant.

Grand Rapids, Mich.—Child, Hulswid & Co. of this city have completed the deal with the Chattanooga Gas Co. and will operate the plant in Chattanooga, Tenn., under the general management of the local company.

GARBAGE DISPOSAL, STREET CLEANING AND SPRINKLING.

Harrison, N. J.—John Penzlack was awarded a three-year contract for scavenger work for $8,350.

Kansas City, Mo.—An ordinance has been introduced to appropriate $90,000 for the purpose of a garbage burner.

Perth Amboy, N. J.—Graham & McKehon secured the contract for the removal of garbage and ashes for $5,144.

New Brighton, L. I., N. Y.—Bids are asked until April 2 for sprinkling various highways. Geo. Cromwell, pres. boro.

Schenectady, N. Y.—Bids are asked until April 24 for the collection and disposal of ashes, rubbish, garbage and dead animals for five years. Chas. O. Dunning, clk. of bd. con. and sup.

New York City.—Bids are asked until 10 a. m. April 2 for furnishing street-sweeping machine at the Navy Yard. E. B. Rogers, Paymaster Gen'l U. S. N., Washington, D. C.

Centralia, Ill.—Special.—Z. T. Condit, cy. clk., desires names and addresses of manufacturers of street-sweeping or street-cleaning machines with catalogs, prices, etc.

Indianapolis, Ind.—Samuel W. Smith and Jas. R. Henry submitted the lowest bid March 5 for the collection, removal and disposal of ashes and sweepings. Their bid, $27,800, is considered high, however.

Memphis, Tenn.—The Memphis Sanitary Co. has been incorporated by D. M. Scales and associates to establish a garbage reduction plant here. The system of Capt. Wiselogel of Indianapolis, Ind., will probably be established.

Indianapolis, Ind.—Contracts for sprinkling the unimproved streets during 1907 were awarded March 13 as follows: District No. 1, Robert Thomas & Co., $16.40 for each 10,000 sq. ft.; Nos. 2 and 3, Frank Kennington, $22.70 and $17.60 respectively; No. 4, H. W. Fuehring, $19.80; Nos. 5 and 6, Frank Kennington, $18.90 each.

PARKS.

Waco, Tex.—Will vote in April on the issue of $50,000 bonds for parks.

Bozeman, Mont.—The Civic League is pushing a plan for a city park in Bogart's Grove.

Nashua, N. H.—The Park Commission will ask an appropriation of $1,500 for the purpose of improving the parks.

Dayton, O.—Bids are asked until April 11 for the sale of bonds for park and boulevard purposes. Sdw. Phillips, cy. audt.

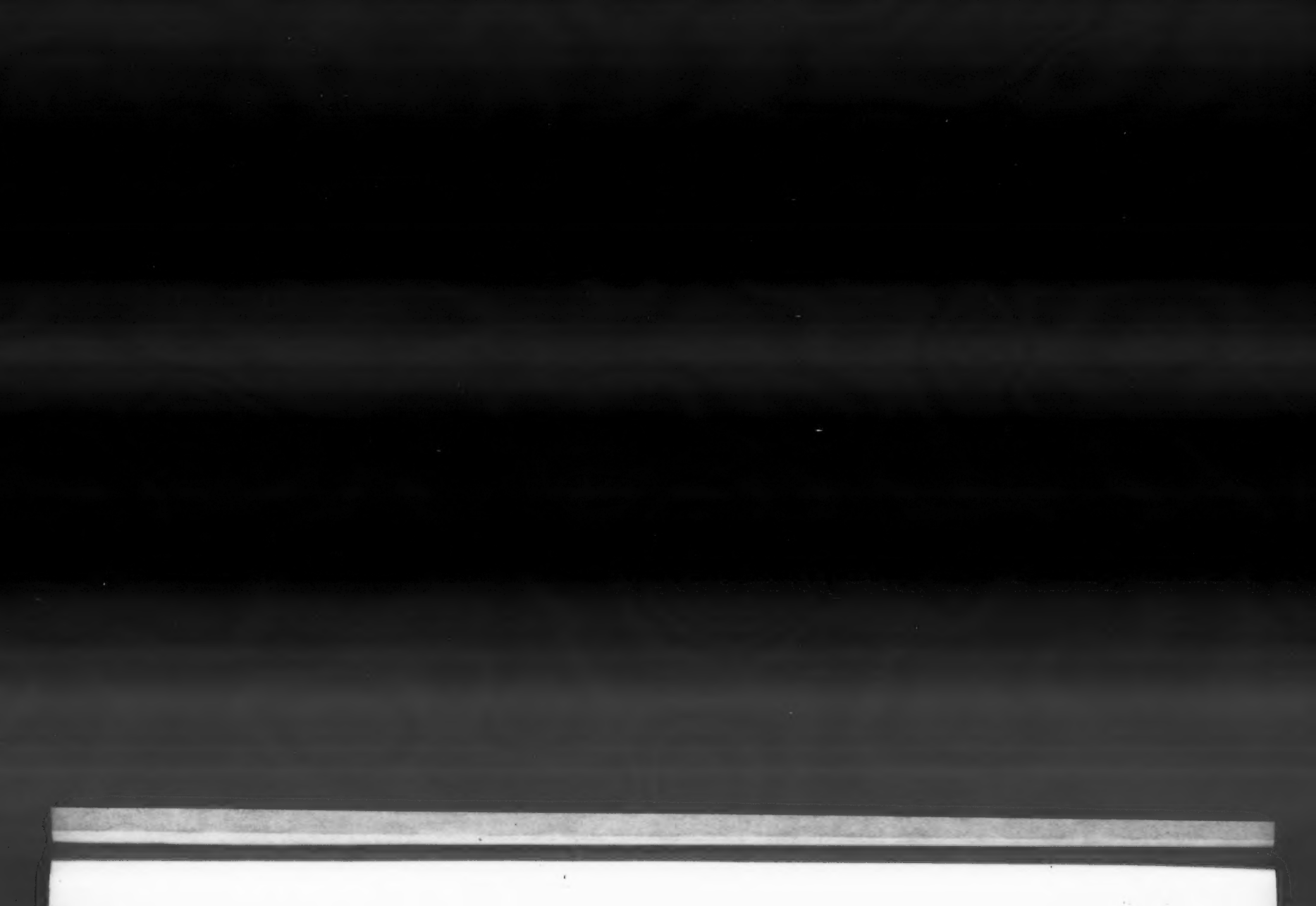
Bay City, Mich.—Gov. Warren signed the bill providing for the issue of $200,000 bonds for establishing the River Front Park in this city.

Portland, Ore.—The Multnoomah, the Park Board, and the Initiative One Hundred are endeavoring to secure the establishment of public play grounds here.

FIRE APPARATUS.

Dexter, Me.—Installation of a fire alarm system is contemplated.

Chicago, Ill.—The Babcock Fire Extinguisher Co. has been incorporated by J. Porter, Oliver Good Doolittle and Max I. Heldman.

Pierre, S. D.—Edward K. Matter says Ald. Greenough has been directed by council to purchase rubber coats and secure prices on a new hook and ladder outfit for the fire department.

Northboro, Mass.—Special.—T. H. Blair, sec. of the committee, says this town is considering the purchase of a chemical engine, and desires to communicate with manufacturers of chemical engines, particularly for use on country roads.